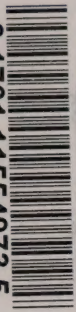



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PACIFIC MARINE SCIENCE REPORT 71-8

**OCEANOGRAPHIC OBSERVATIONS AT  
OCEAN STATION P (50° N, 145° W)  
VOLUME 49**

**October 30, 1970 - January 14, 1971**

**K.A. Gantzer, D.A. Healey**



*Canada*  
**Department of the Environment  
Marine Sciences Branch  
Pacific Region  
512 Federal Bldg  
Victoria, B.C.**







## MARINE SCIENCES BRANCH, PACIFIC REGION

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Marine Sciences Branch  
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## INTRODUCTION

Canadian operation of Ocean Weather Station P (latitude 50°00'N, longitude 145°00'W) was inaugurated in December, 1950. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the CCGS VANCOUVER and the CCGS QUADRA. Each ship remains on station for a period of six weeks, and is then relieved by the alternative ship, thus maintaining a continuous watch. The chief purpose of the station is to operate as a meteorological station for surface and upper-air observations and as an air-sea rescue station.

Bathythermograph observations have been made at Station P since July, 1952. A program of more extensive oceanographic observations was commenced in August, 1956. This was further extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections in addition to being made on Line P oceanographic stations are also made at odd meridians at 40' i.e. 139°40'W, 141°40'W, etc. Data observed prior to 1968 has been indexed by Collins et al, (1969).

The present record includes Hydrographic data collected from the VANCOUVER during the period October 30 to December 10, 1970 and hydrographic and salinity-temperature-pressure data collected from the QUADRA during the period December 4, 1970 to January 14, 1971. Mechanical and expendable bathythermograph traces obtained on these cruises are available on IBM microfiche cards and will be available in digitized format on magnetic tape in the near future.

All physical data has been archived by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), The Biological Station, Nanaimo, B.C., Canada. Requests for these data should be directed to FRB.

Bird observations are sent to Dr. M. Myres, University of Calgary, Calgary, Alberta, Canada; and Marine Mammal observations to Mr. I. McAskie, Fisheries Research Board of Canada, The Biological Station, Nanaimo, B.C. Canada.

Marine Geochemical data are for the Ocean Chemistry Group, Marine Sciences Branch, Department of the Environment, the Biological Station, Nanaimo, B.C., Canada.

Program of observations from CCGS VANCOUVER, October 30 to December 10, 1970 (P-70-8) (CODC Ref. No. 02-70-008)

Oceanographic observations were made by Mr. K. A. Gantzer of the Marine Sciences Branch, Department of the Environment.

En route to Station P stations 1 to 12 were occupied. At each station an expendable BT cast was made to 450 meters and surface salinity and nitrate samples were collected. Expendable BT casts were also made on all Line P BT stations.

On Station P profiles of salinity, temperature and oxygen were obtained as follows:

- 1) Weekly Nansen bottle casts to near bottom (4200 meters)
- 11) Mechanical BT casts were made eight times daily
- 111) A bucket surface salinity sample was obtained at 0000 hours GMT daily.

Other observations made and data obtained at Station P were as follows:

1) Biological

Plankton tows were made as follows:

- a) Vertical Hauls: weekly from 150 meters. A total of 3 from 1200 meters.
- b) Horizontal tows: A total of eight 10 minute tows.

11) Productivity

The following samples for productivity studies were taken:

- a) Weekly surface samples for photosynthesis and plant pigments.
- b) A total of 3 Van Dorn bottle casts to 200 meters for plant pigment,  $C^{14}$  and nitrate.



111) Marine Geochemical

The following samples for the marine geochemical studies were obtained:

- a) Duplicate nutrient samples at standard depths from two hydro casts
- b) Daily nutrient samples from the ship's seawater loop.
- c) Alkalinity samples from the seawater loop
- d) Weekly air samples for CO<sub>2</sub> analysis.

1V) Marine Mammal, Bird and observations for other Institutes

- a) Marine Mammal and Bird observation logs were kept
- b) Rainwater and sea surface samples were taken for Scripps Institute of Oceanography

En route from Station P expendable BT casts were made and sea surface salinity and nitrate samples collected at all Line P Hydrographic and BT stations.

Program of Observations from CCGS QUADRA, December 4, 1970 to January 14, 1971 (P-70-9) (CODC Ref. No. 02-70-009)

Oceanographic observations were made by Mr. D. A. Healey of the Marine Sciences Branch, Department of the Environment.

En route to Station P station 1 was occupied and a STD observation to near bottom made with a Bissett-Berman Model 9006 STD. A mechanical BT cast was made and surface salinity sample collected on this station and on station 2. The rest of the Line P program was cancelled due to bad weather.

On Station P profiles of salinity, temperature and oxygen were obtained as follows:

- 1) Weekly Nansen bottle casts to near bottom (4200 meters)
- 11) STD casts to 1500 meters with each Nansen bottle cast
- 111) STD casts to 300 or 1500 meters twice weekly
- 1V) Mechanical BT casts to 275 meters were made eight times daily.
- V) A bucket sea surface salinity sample was collected daily at 0000 hours GMT.

Other observations made and data obtained at Station P were as follows:

1) Biological

Plankton tows were made as follows:

- a) Vertical Hauls: Weekly from 150 meters and twice during the patrol from 1200 meters.
- b) Horizontal Tows: Seven 10 minute tows during the patrol.

11) Productivity

The following samples for productivity studies were taken:

- a) Two Van Dorn bottle casts to 200 meters for nitrate, plant pigment and photosynthesis analysis and one surface sample for photosynthesis.
- b) Weekly Secchi disk observations.

111) Marine Geochemistry

The following samples for marine geochemical studies were obtained:

- a) weekly oxygen samples from the hydro casts
- b) nutrient samples -- twice from the Hydro casts, daily from the ship's seawater loop and hourly for one 24 hour period from the seawater loop.
- c) alkalinity samples from one hydro cast.
- d) seawater  $C_{14}$  samples twice from the sea water loop
- e) weekly duplicate air samples for  $CO_2$  analysis

1V) Marine Mammal, Bird and Observations for other Institutes

- a) Marine mammal and bird logs were kept.
- b) Rainwater and surface samples for Scripps Institute of Oceanography were obtained.

En route from Station P no oceanographic observations were made.



Data was processed by Messrs. C. de Jong and D. Smith, and assembled and edited for publication by Mr. K. Abbott-Smith.

### Observational Procedures

Temperatures at depth were measured by deep-sea reversing thermometers of German (Richter and Wiese) or Japanese (Yoshino Keiki Co.) manufacture. Two protected thermometers were used on all Nansen bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be  $\pm 0.02^\circ\text{C}$ .

Surface water temperatures were measured from a bucket sample using a deck thermometer of  $\pm 0.1^\circ\text{C}$  accuracy.

Salinity determinations were made at sea and ashore on Cruise P-70-8 using an Autolab Model 601 Mark III Inductive Salinometer and on Cruise P-70-9 a Bissett-Berman Model 6220 Lab Salinometer was used at sea. Accuracy using duplicate determinations is estimated to be  $\pm 0.003$  ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of  $\pm 5$  m for depths less than 1000 m, and  $\pm 0.5\%$  of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Salinity-temperature-pressure data were obtained with a Bissett-Berman Model 9006 STD on Cruise P-70-9.

### Computations

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 563 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity and dissolved oxygen vs log<sub>10</sub> depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Analog records from the salinity-temperature-pressure instrument have been hand digitized, then replotted using the Calcomp Plotter. Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (decibars Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in meters
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of $10^8$ ergs/cm <sup>2</sup>
OXY	is the concentration of dissolved oxygen expressed in milliliters per liter
V-B PERIOD	is the " " " Vaisala-Brunt period in minutes

#### Summary of Hydrographic Data

The data are graphically summarized as follows:

Composite plot of temperature vs  $\log_{10}$  depth (Figs. 4 & 5), composite plot of salinity vs  $\log_{10}$  depth (Figs. 6 & 7) and composite plot of oxygen vs  $\log_{10}$  depth (Fig. 8) for P-70-8 and composite plot of temperature vs  $\log_{10}$  depth (Fig. 9), composite plot of salinity vs  $\log_{10}$  depth (Fig. 10) and composite plot of oxygen vs  $\log_{10}$  depth (Fig. 11) for P-70-9.



## REFERENCES

- Carpenter, J.H. 1965. The Chesapeake Bay Institute Technique for the Winkler Dissolved Oxygen Method. *Limnol. & Oceanogr.*, 10: 141-143.
- Collins, C.A., R.L. Tripe, D.A. Healey, and J. Joergensen, 1969. The Time Distribution of Serial Oceanographic Data from the Ocean Station P Program. Fisheries Research Board of Canada, Technical Report No. 106.
- Reiniger, R.F. and C.K. Ross, 1968. A Method of Interpolation with Application to Oceanographic Data. *Deep Sea Re.* 15: 185-193.
- U.S.N. Hydrographic Office, 1955. Instruction Manual for Oceanographic Observations, Publication No. 607.

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- Figure 4      Composite plot of temperature vs  $\log_{10}$  depth P-70-8.
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- Figure 6      Composite plot of salinity vs  $\log_{10}$  depth P-70-8.
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- Figure 12     T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) obtained from bucket samples during Cruise P-70-8.
- Figure 13     T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) obtained from ship's seawater loop during Cruise P-70-8.
- Figure 14     T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) during Cruise P-70-9.



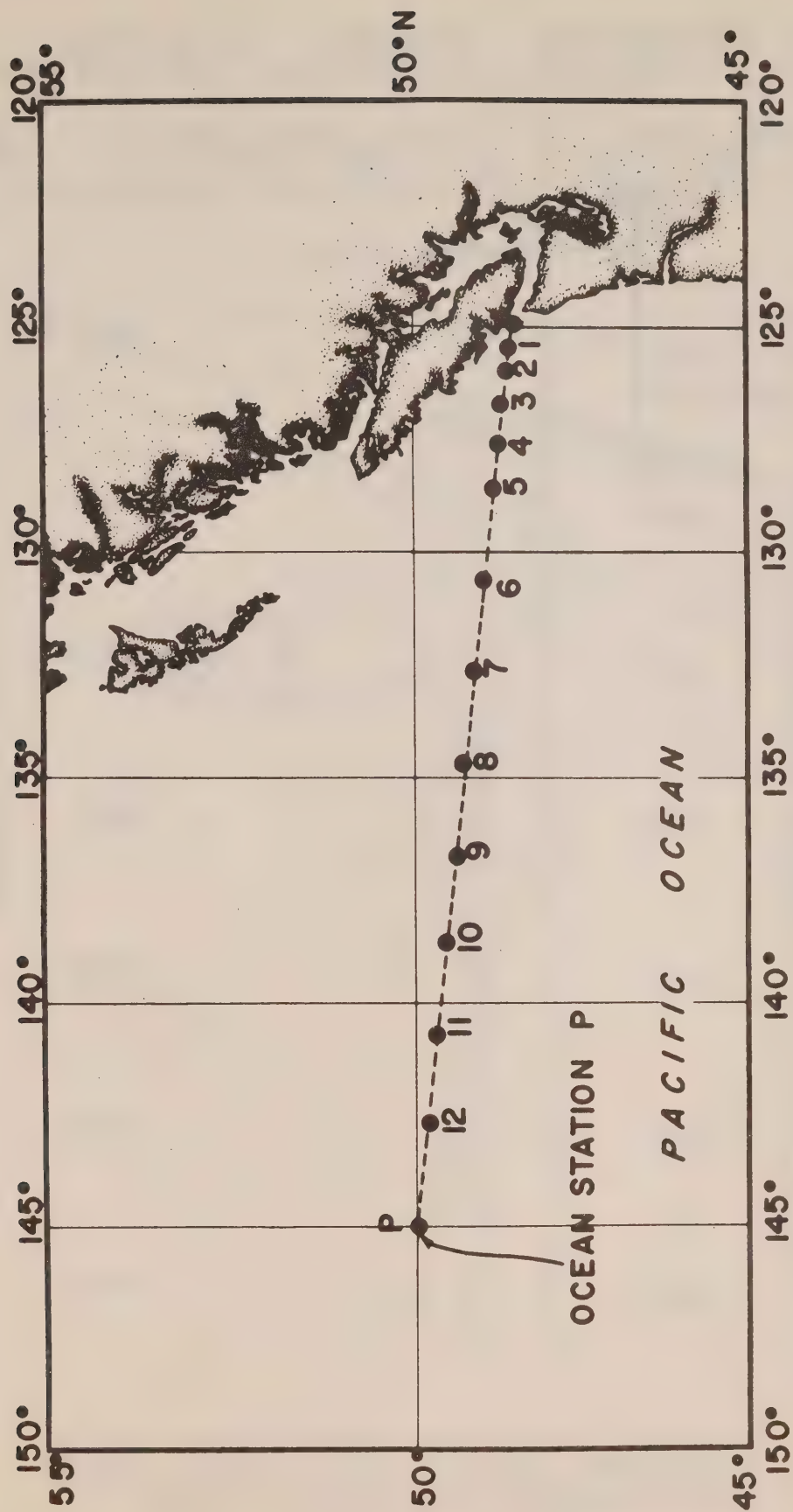


Fig. 1 Chart showing Line P station positions.

# SALINITY DIFFERENCE, NANSEN - S.T.D., ‰

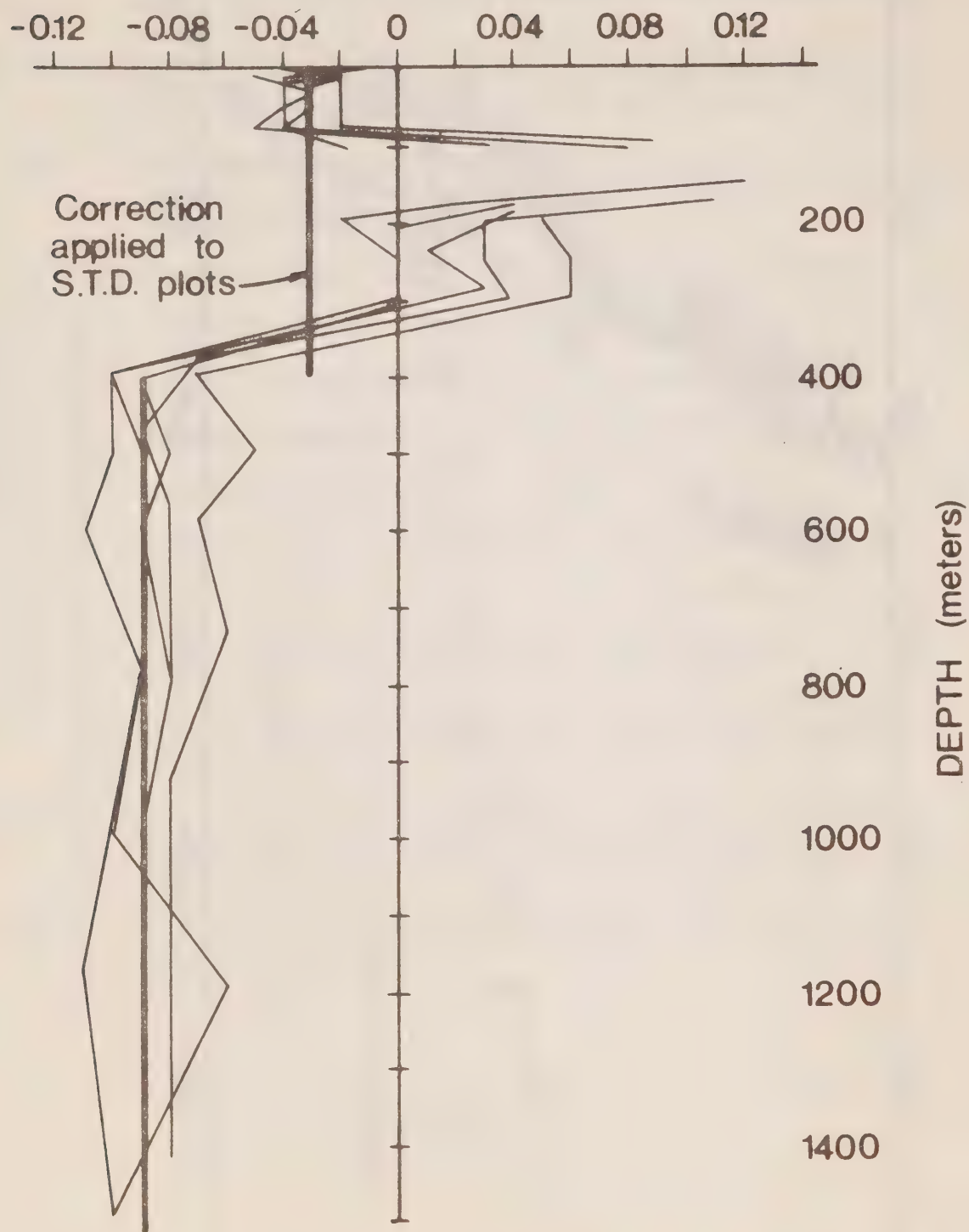


Fig. 2 Profiles of the salinity difference between samples obtained from bottles and from data obtained from a Bissett-Berman Model 9006 STD Ref. No. 70-009.



TEMPERATURE DIFFERENCE, NANSEN - S.T.D., °C

-0.16 -0.12 -0.08 -0.04 0 0.04 0.08 0.12

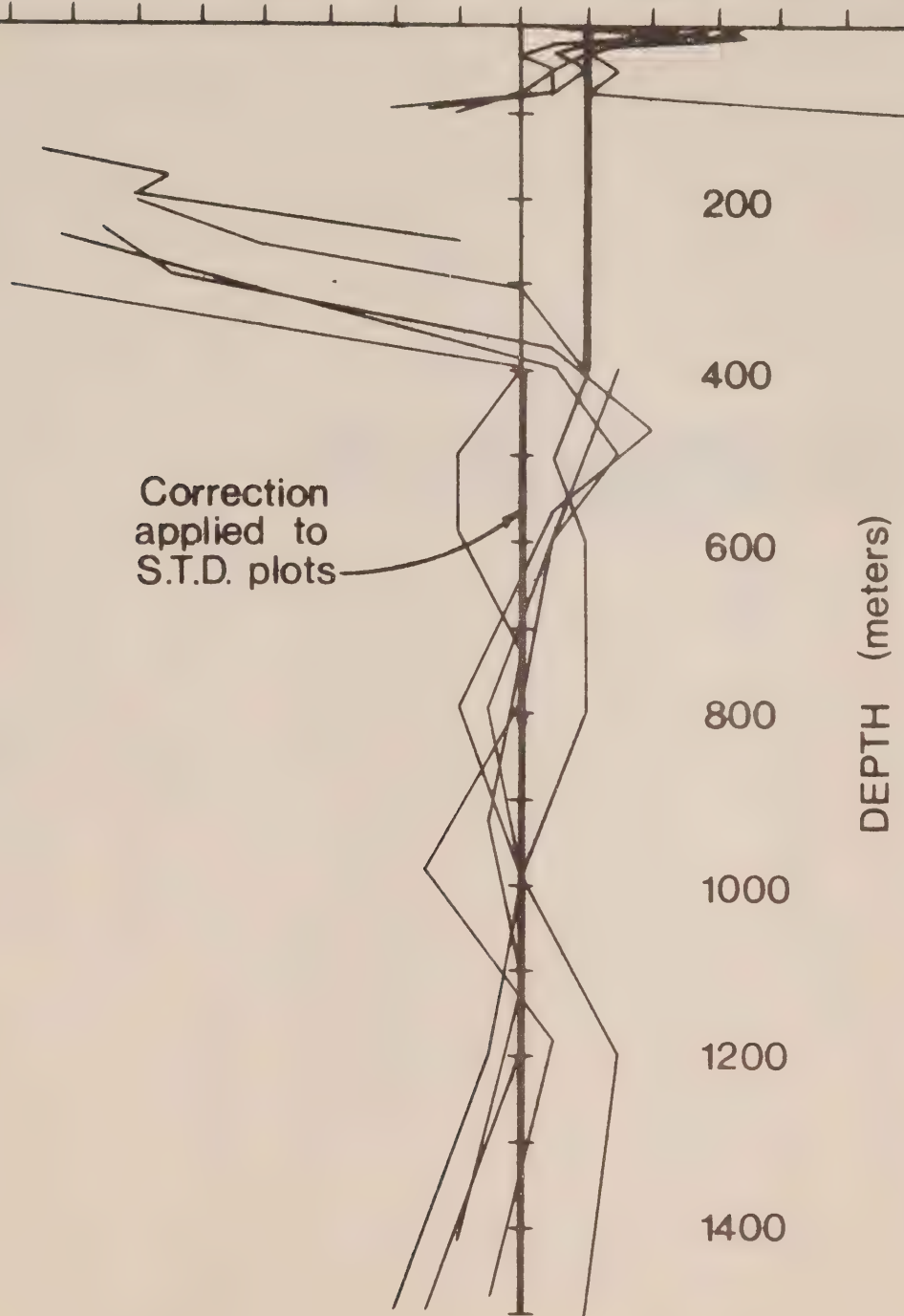


Fig. 3 Profiles of the temperature difference between Reversing Thermometers and data from a Bissett-Berman Model 9006 STD Ref. No. 70-009.





COMPOSITE PLOTS OF TEMPERATURE, SALINITY  
AND DISSOLVED OXYGEN VS LOG<sub>10</sub> DEPTH  
(P-70-8)

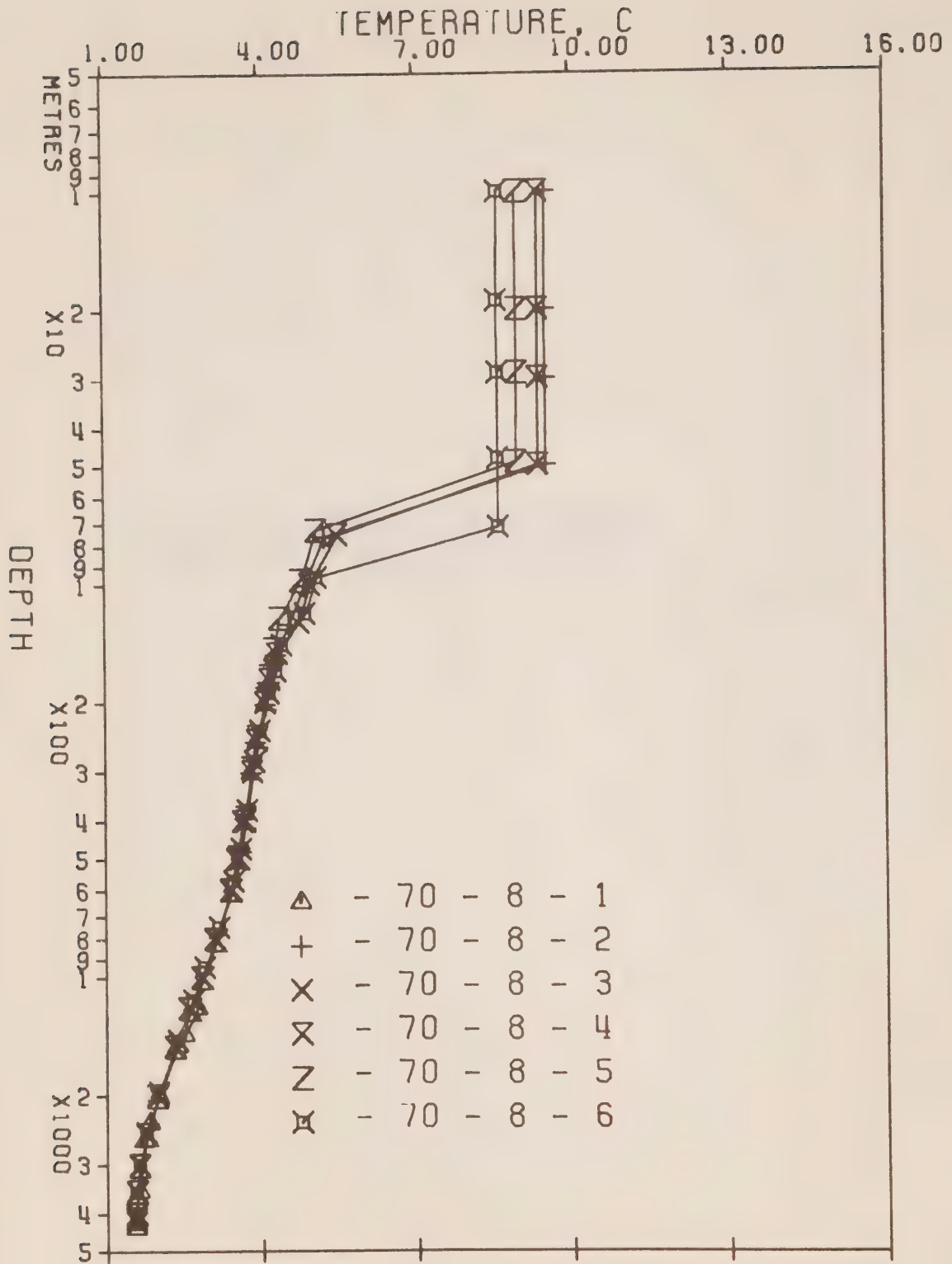


Fig. 4 Composite plot of temperature vs  $\log_{10}$  depth P-70-8.



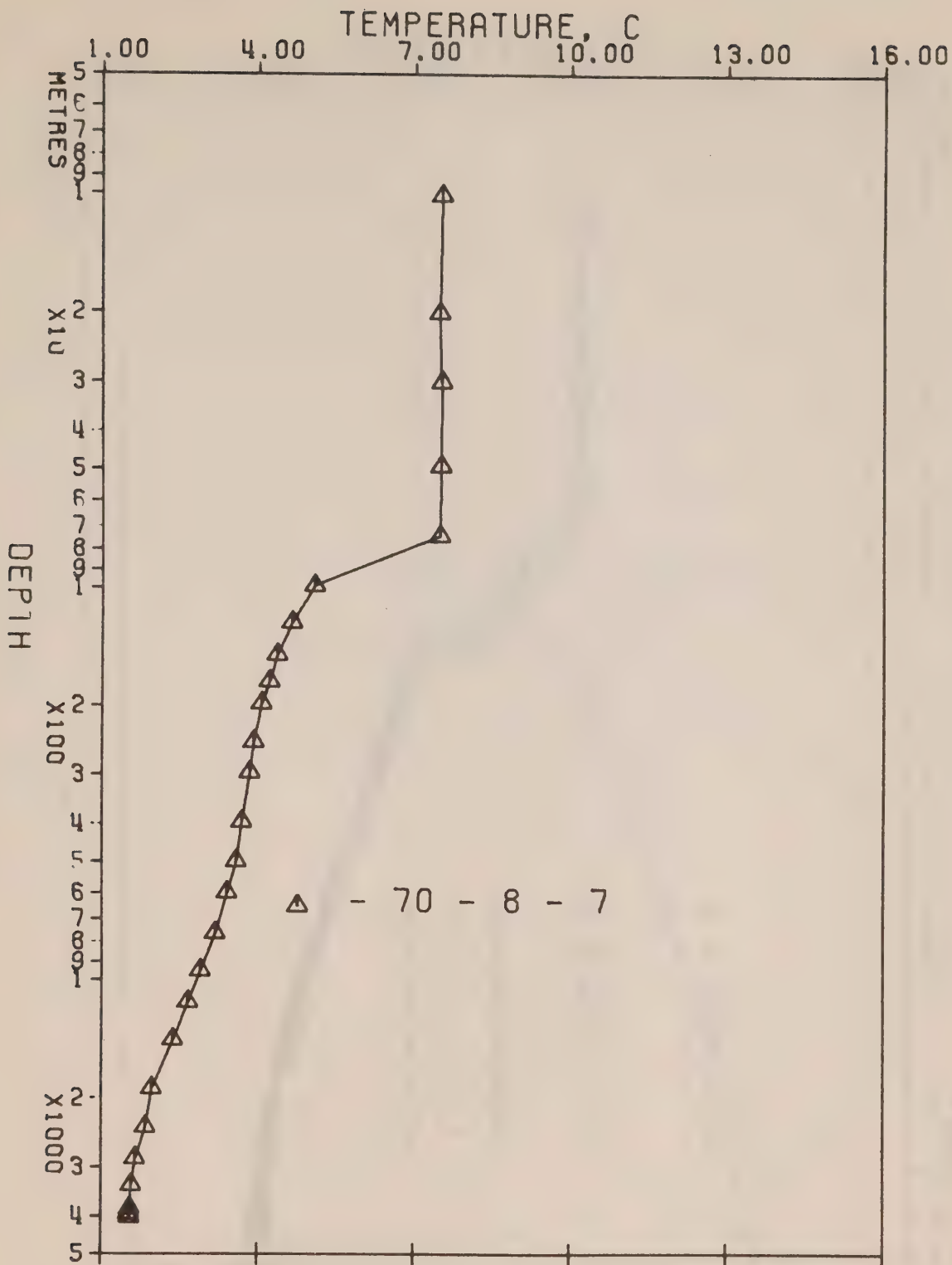


Fig. 5 Composite plot of temperature vs  $\log_{10}$  depth P-70-8.

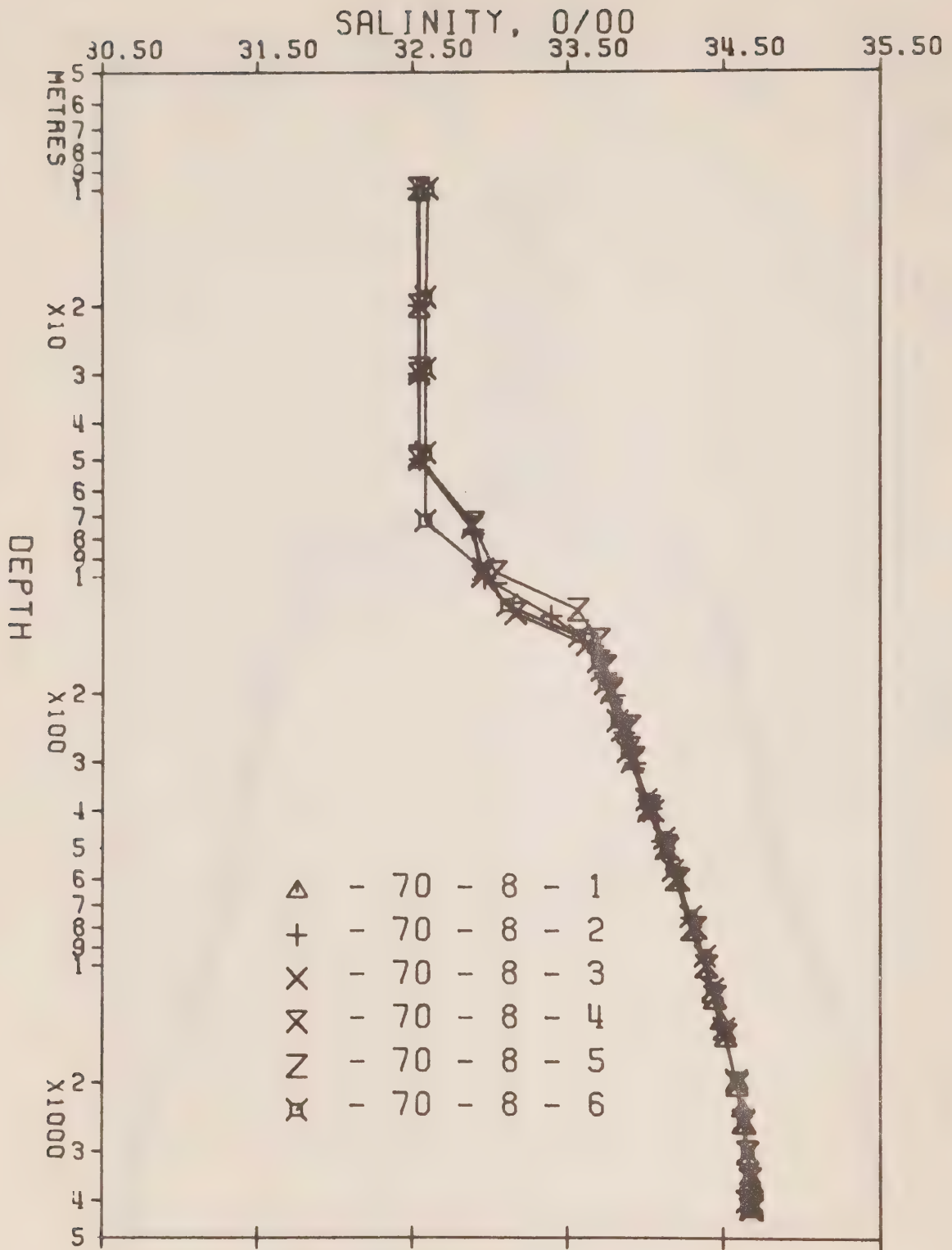


Fig. 6 Composite plot of salinity vs  $\log_{10}$  depth P-70-8.



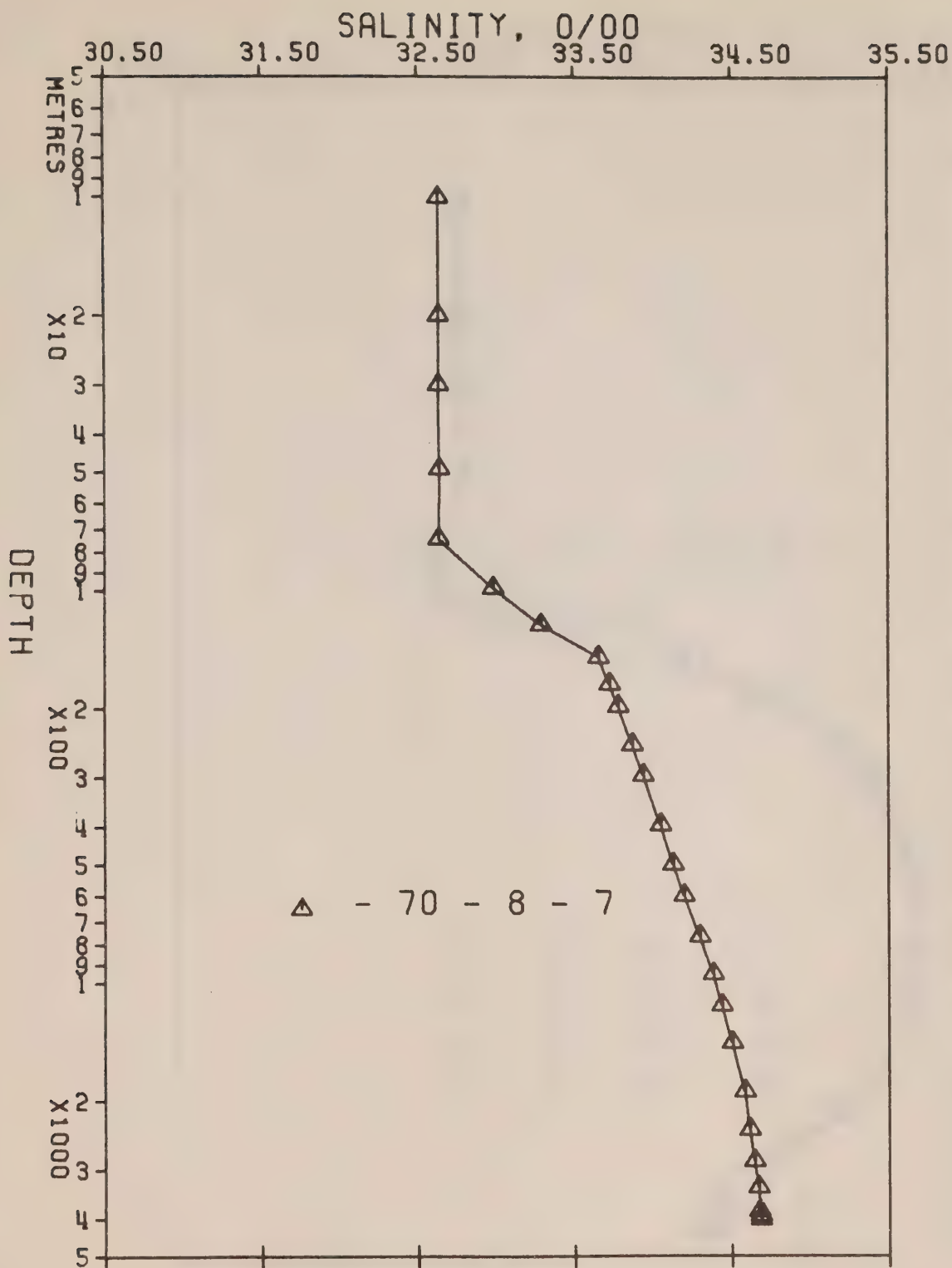


Fig. 7 Composite plot of salinity vs  $\log_{10}$  depth P-70-8.

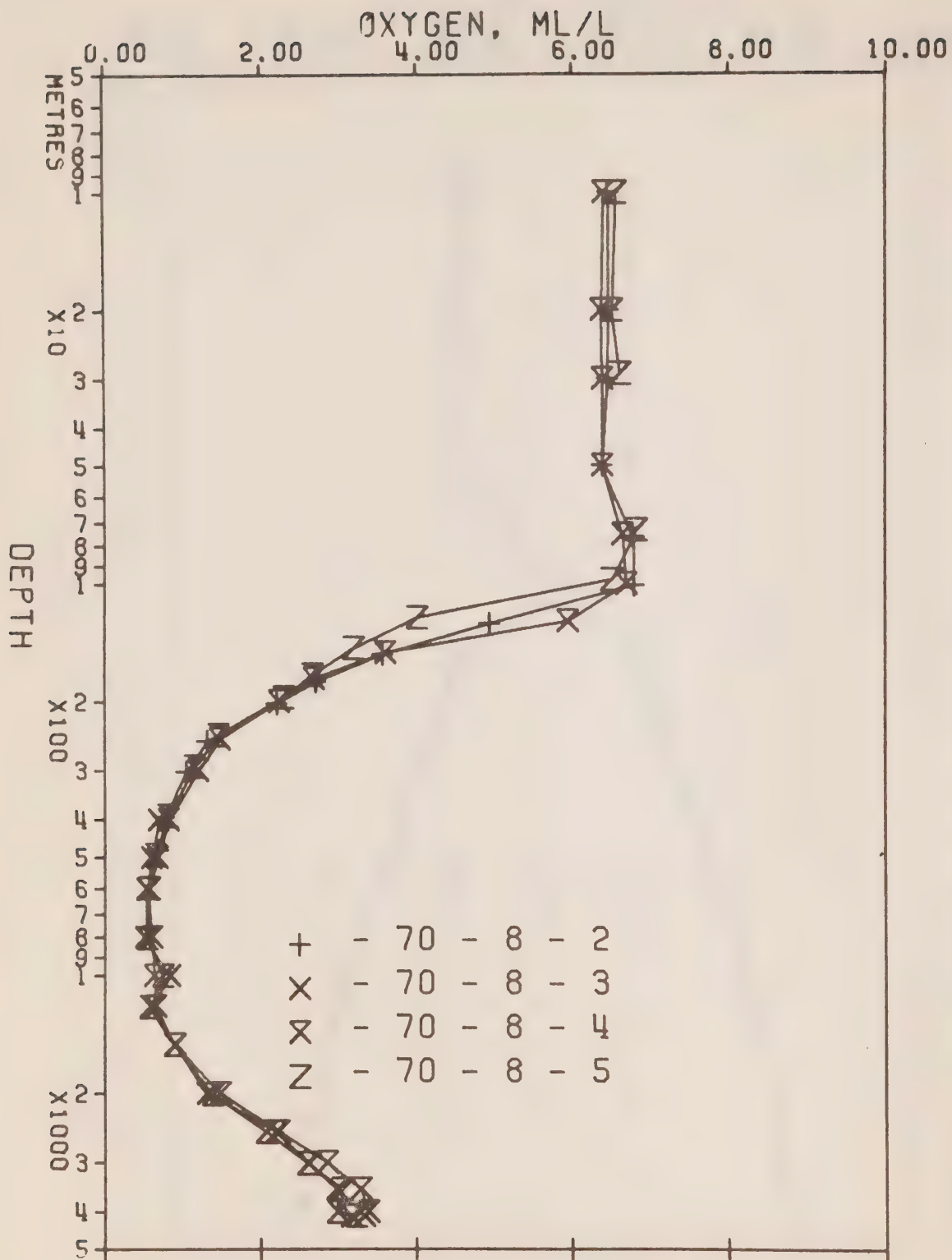


Fig. 8 Composite plot of oxygen vs  $\log_{10}$  depth P-70-8.



COMPOSITE PLOTS OF TEMPERATURE,  
SALINITY AND DISSOLVED OXYGEN  
VS LOG<sub>10</sub> DEPTH  
(P-70-9)

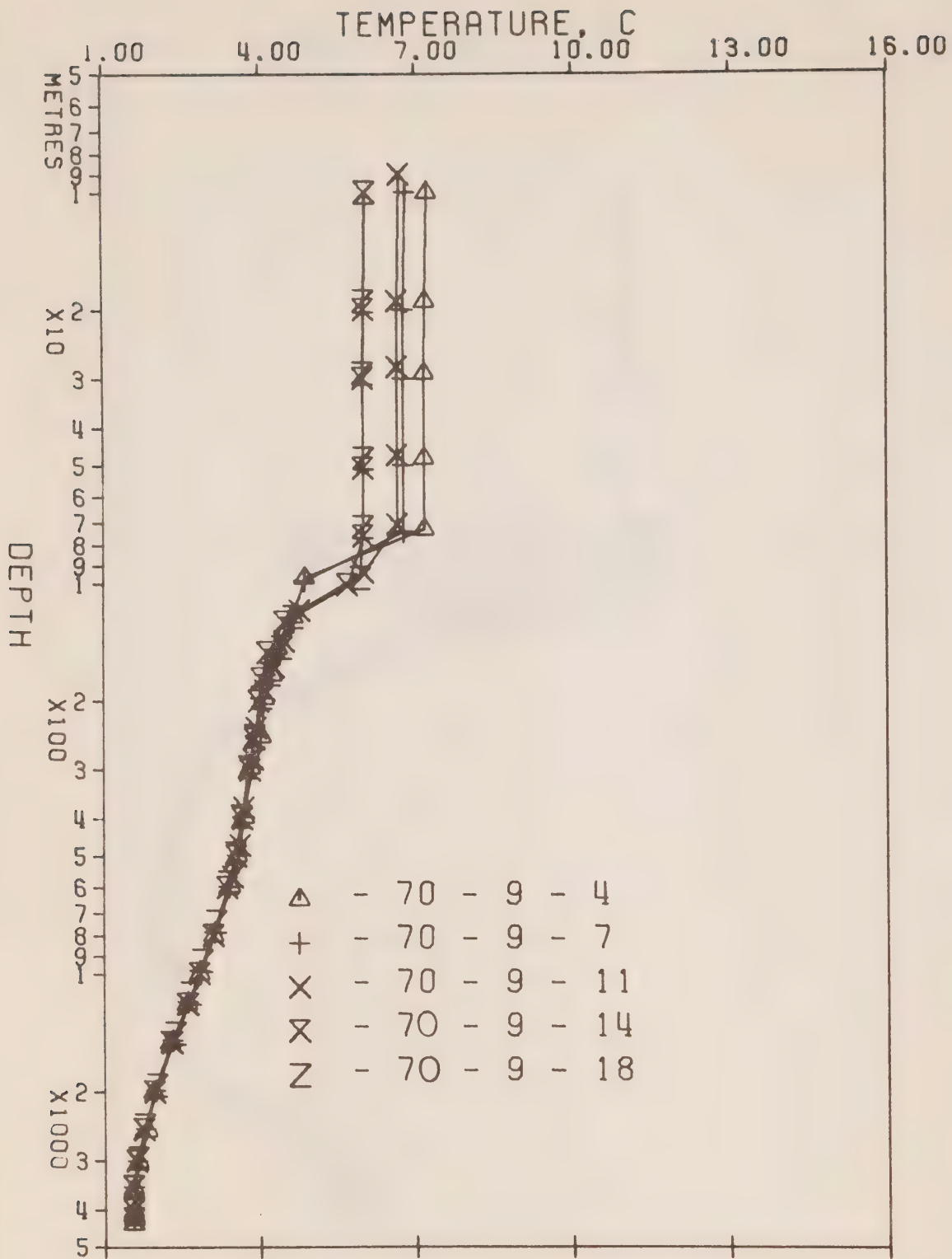


Fig. 9 Composite plot of temperature vs  $\log_{10}$  depth P-70-9.



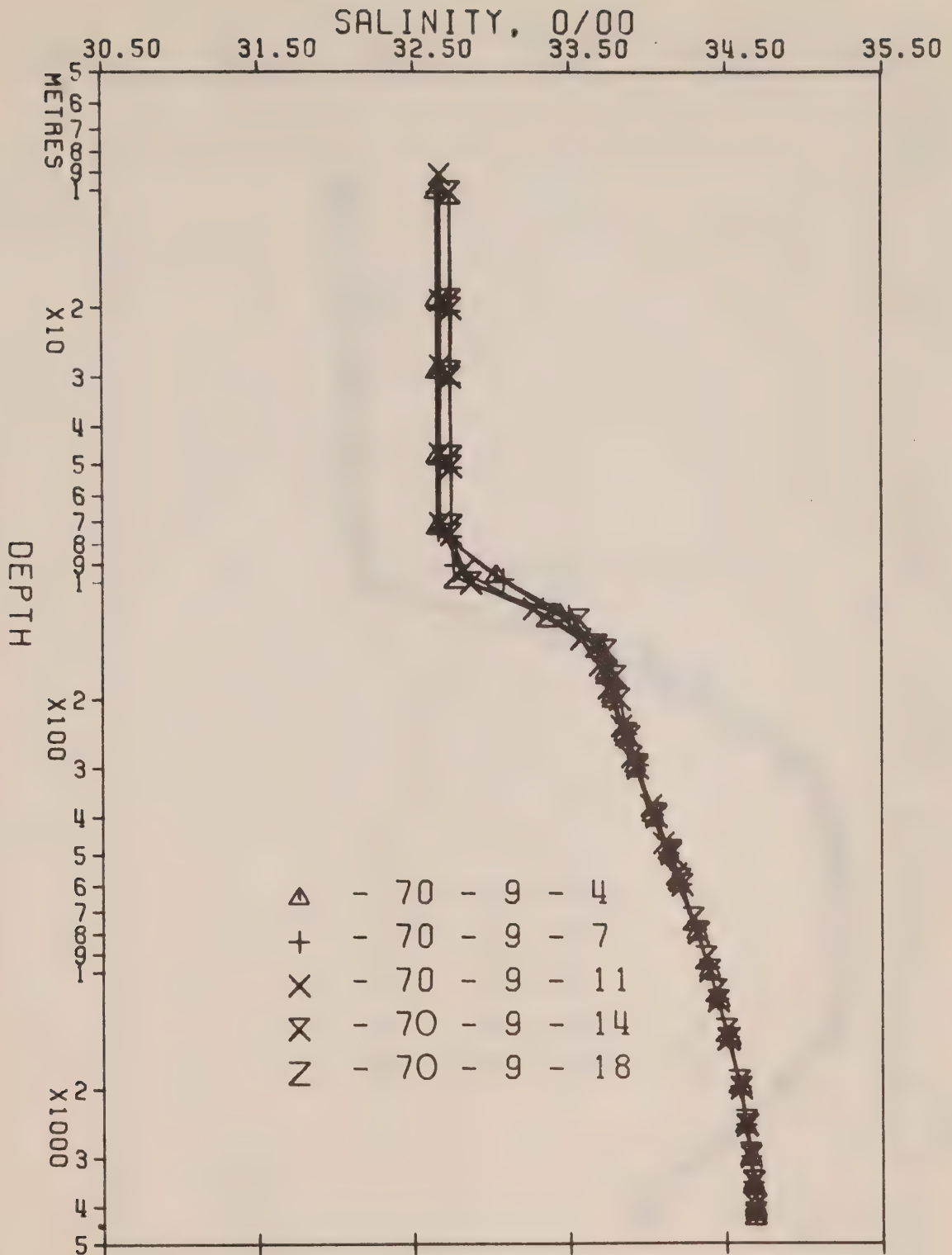


Fig. 10 Composite plot of salinity vs  $\log_{10}$  depth P-70-9.

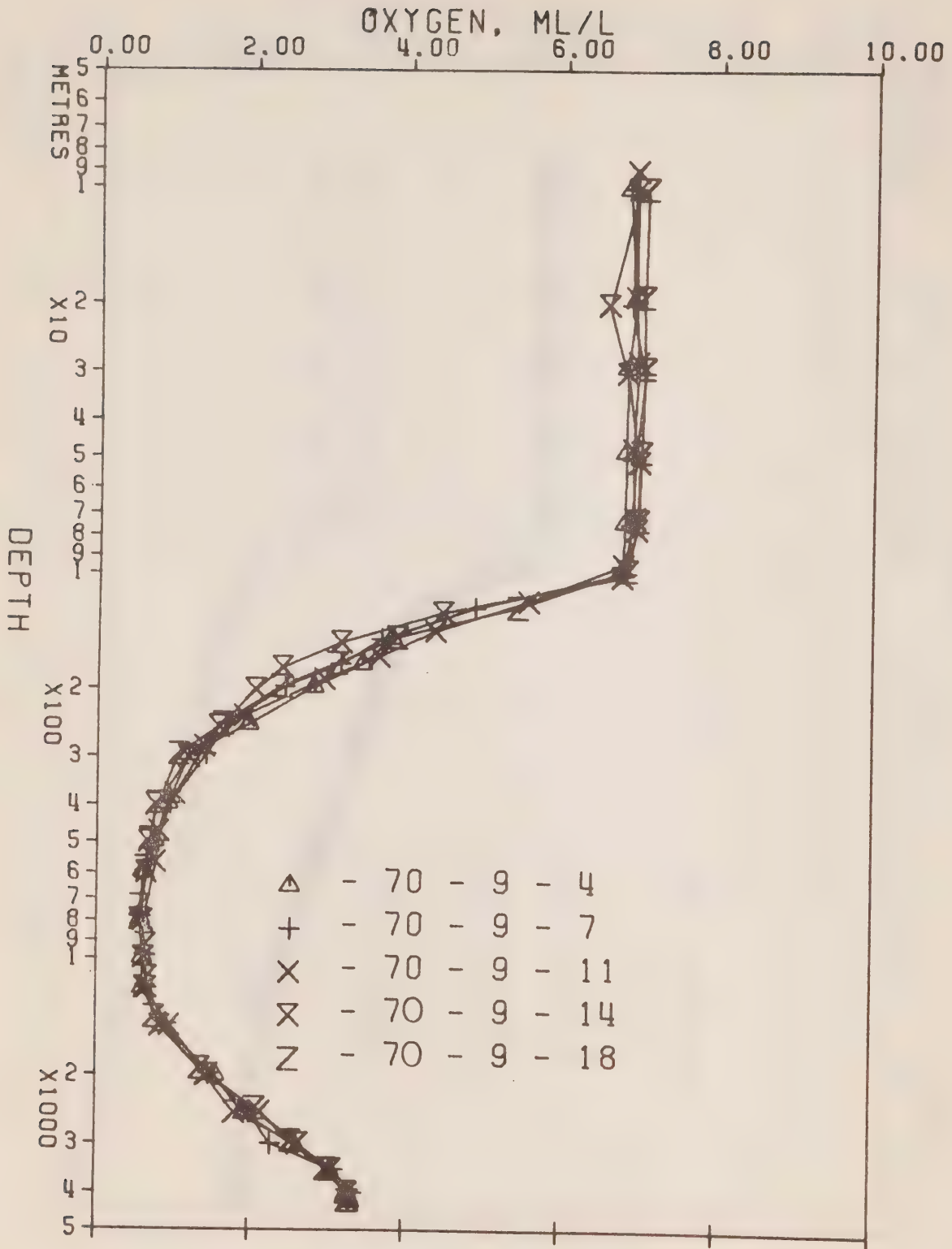
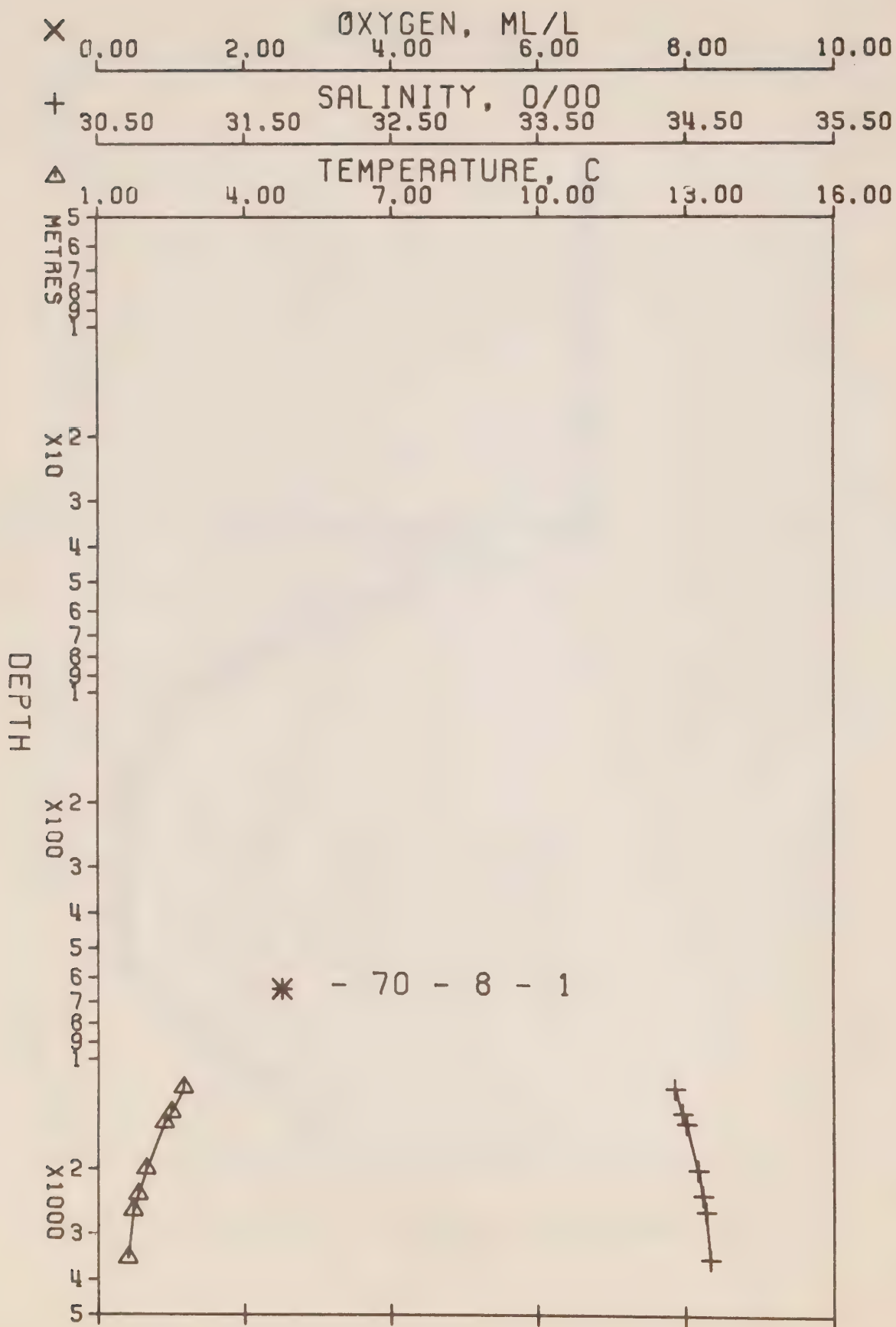


Fig. 11 Composite plot of oxygen vs  $\log_{10}$  depth P-70-9.

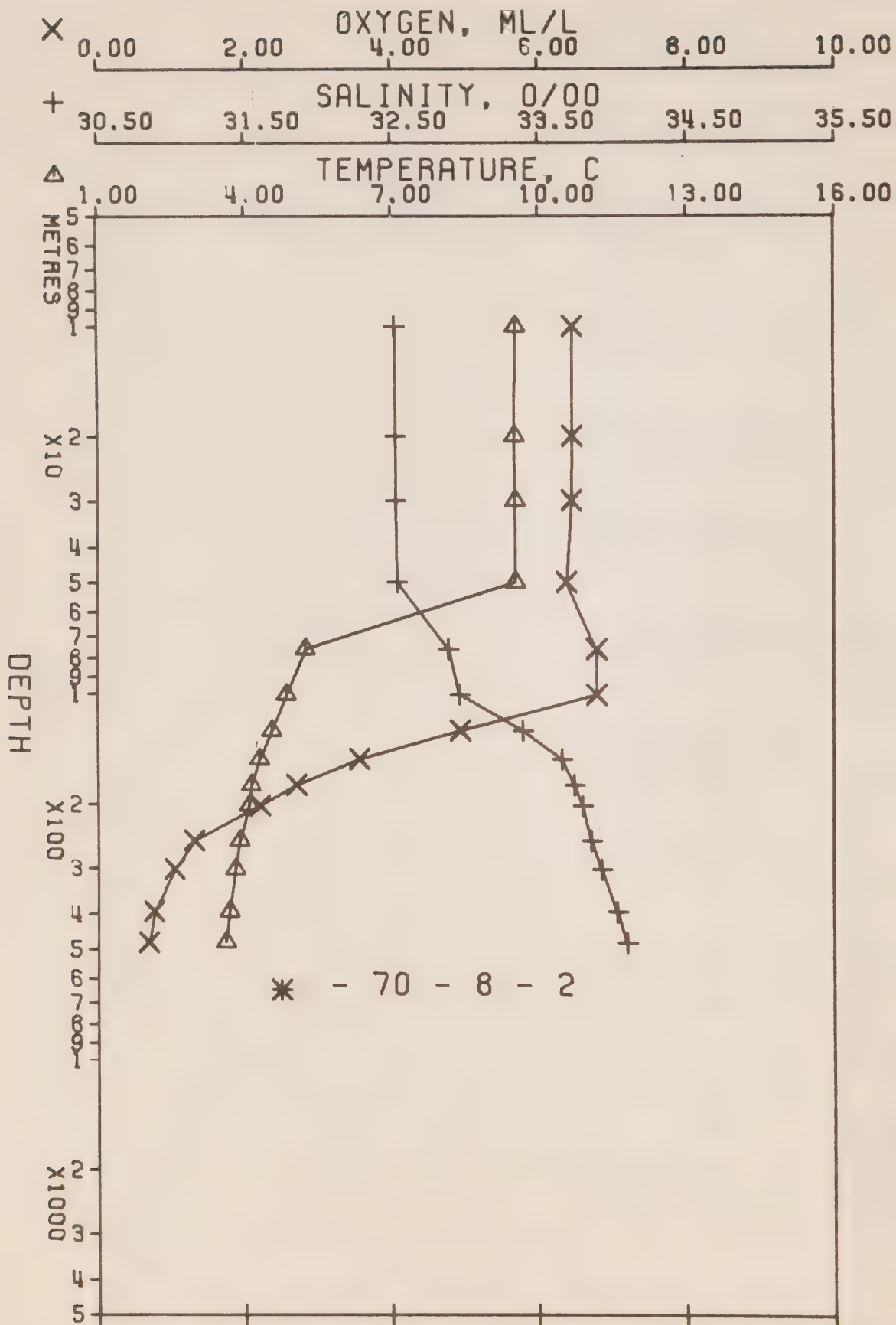
RESULTS OF NANSEN BOTTLE CASTS  
(P-70-8)





PACIFIC OCEANOGRAPHIC GROUP  
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 HYDROGRAPHIC CAST DATA

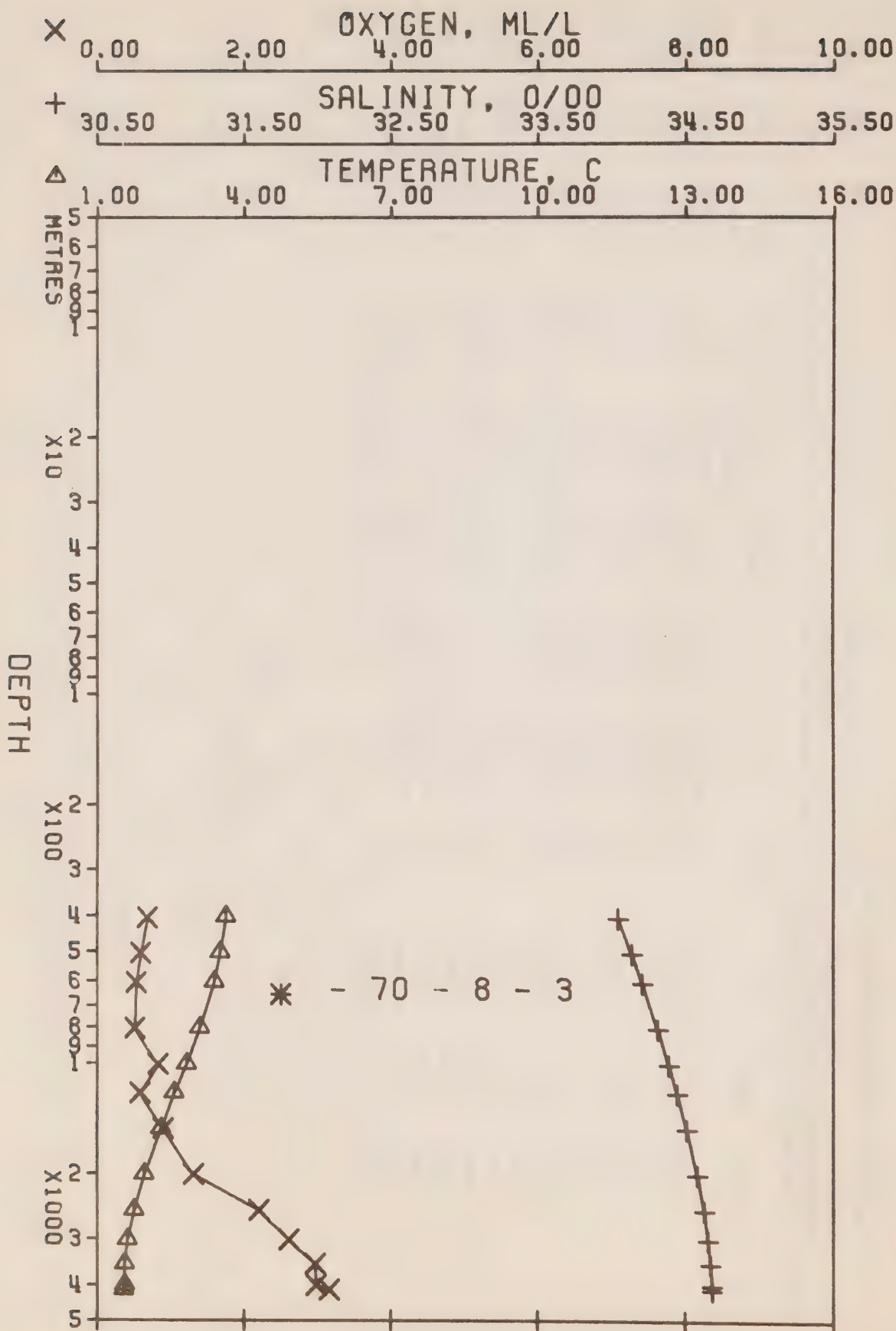
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
1214	2.72	34.432	1201	27.482	68.5	2.64	60.4	0.2	0.0	0.0	1481.
1416	2.47	34.482	1400	27.543	63.0	2.37	54.5	1.69	13.11	0.0	1483.
1516	2.34	34.503	1499	27.571	60.5	2.24	51.9	2.31	22.37	0.0	1484.
2022	1.96	34.584	1997	27.666	52.3	1.82	42.6	5.12	73.14	0.0	1491.
2377	1.80	34.615	2346	27.703	49.4	1.63	38.9	6.32	113.56	0.0	1496.
2633	1.69	34.637	2597	27.729	47.2	1.50	36.3	8.16	145.07	0.0	1500.
3567	1.58	34.665	3510	27.760	46.5	1.30	32.8	12.47	281.56	0.0	1516.





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 70- 8- 2 DATE 4/11/70  
 POSITION 50- 0.0 N. 145- 0.0 W GMT 18.5  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	CXY	SOUND
10	9.54	32.532	10	25.126	285.1	9.54	284.6	0.0	0.0	6.47	1486.
20	9.52	32.535	20	25.132	284.8	9.52	284.1	0.29	0.03	6.47	1486.
30	9.53	32.537	30	25.132	284.9	9.53	284.1	0.57	0.10	6.46	1486.
50	9.53	32.546	50	25.139	284.6	9.52	283.4	1.15	0.34	6.39	1486.
76	5.23	32.894	76	26.007	202.0	5.22	200.9	1.79	0.75	6.80	1470.
102	4.84	32.971	101	26.111	192.2	4.83	191.0	2.28	1.20	6.80	1469.
128	4.54	33.402	127	26.485	156.9	4.53	155.5	2.74	1.73	4.94	1469.
153	4.29	33.665	152	26.720	134.8	4.28	133.1	3.10	2.25	3.56	1469.
179	4.12	33.750	178	26.805	126.9	4.11	125.1	3.44	2.83	2.70	1469.
204	4.08	33.803	203	26.851	122.8	4.07	120.6	3.76	3.44	2.20	1469.
255	3.98	33.866	253	26.922	116.4	3.86	114.0	4.36	4.85	1.30	1469.
304	3.79	33.936	302	26.986	110.6	3.77	107.8	4.92	6.45	1.03	1470.
399	3.67	34.042	396	27.083	102.2	3.64	98.7	5.93	10.05	0.75	1471.
484	3.59	34.103	480	27.139	97.5	3.56	93.2	6.77	13.86	0.68	1472.



PACIFIC OCEANOGRAPHIC GROUP

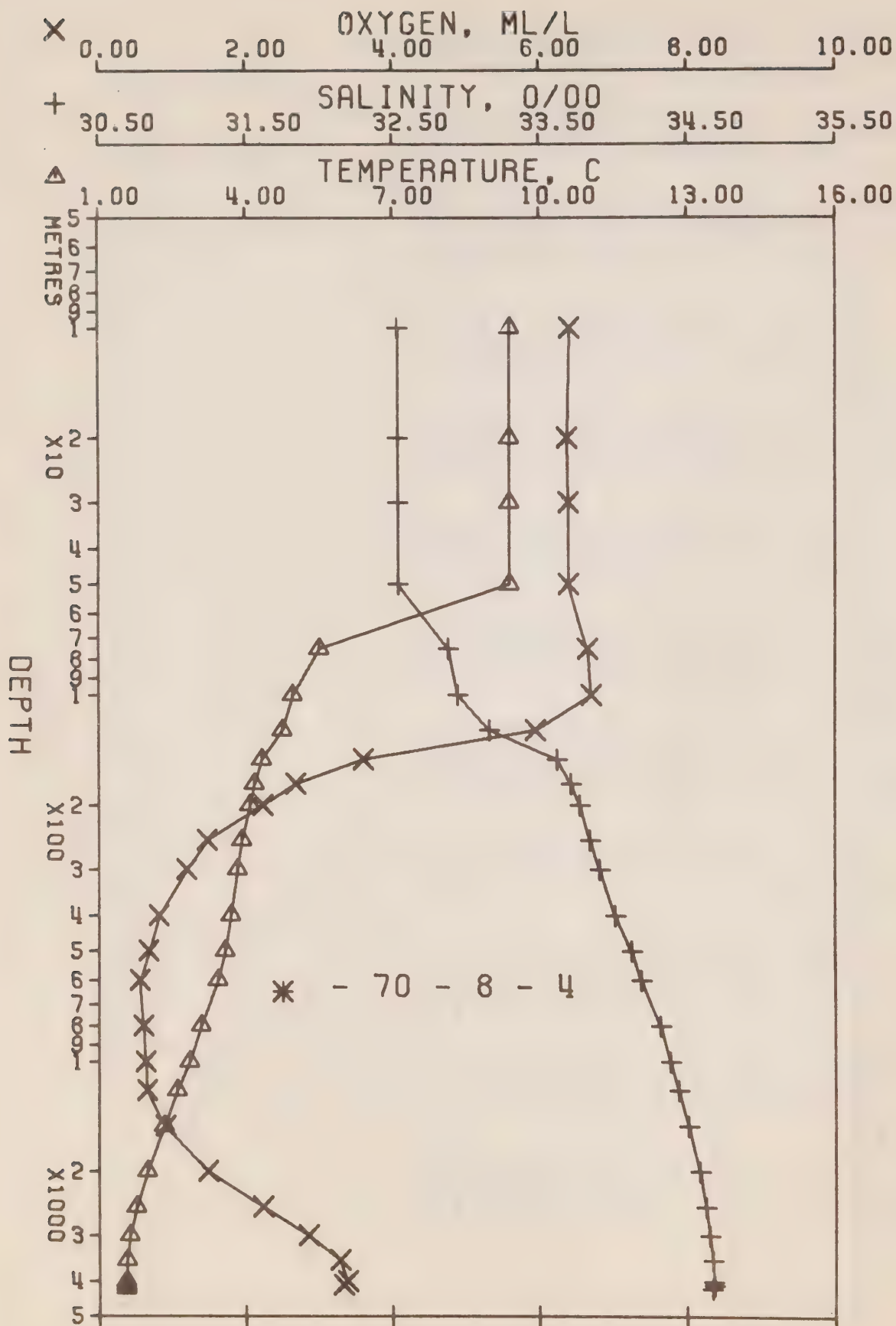
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HYDROGRAPHIC CAST DATA

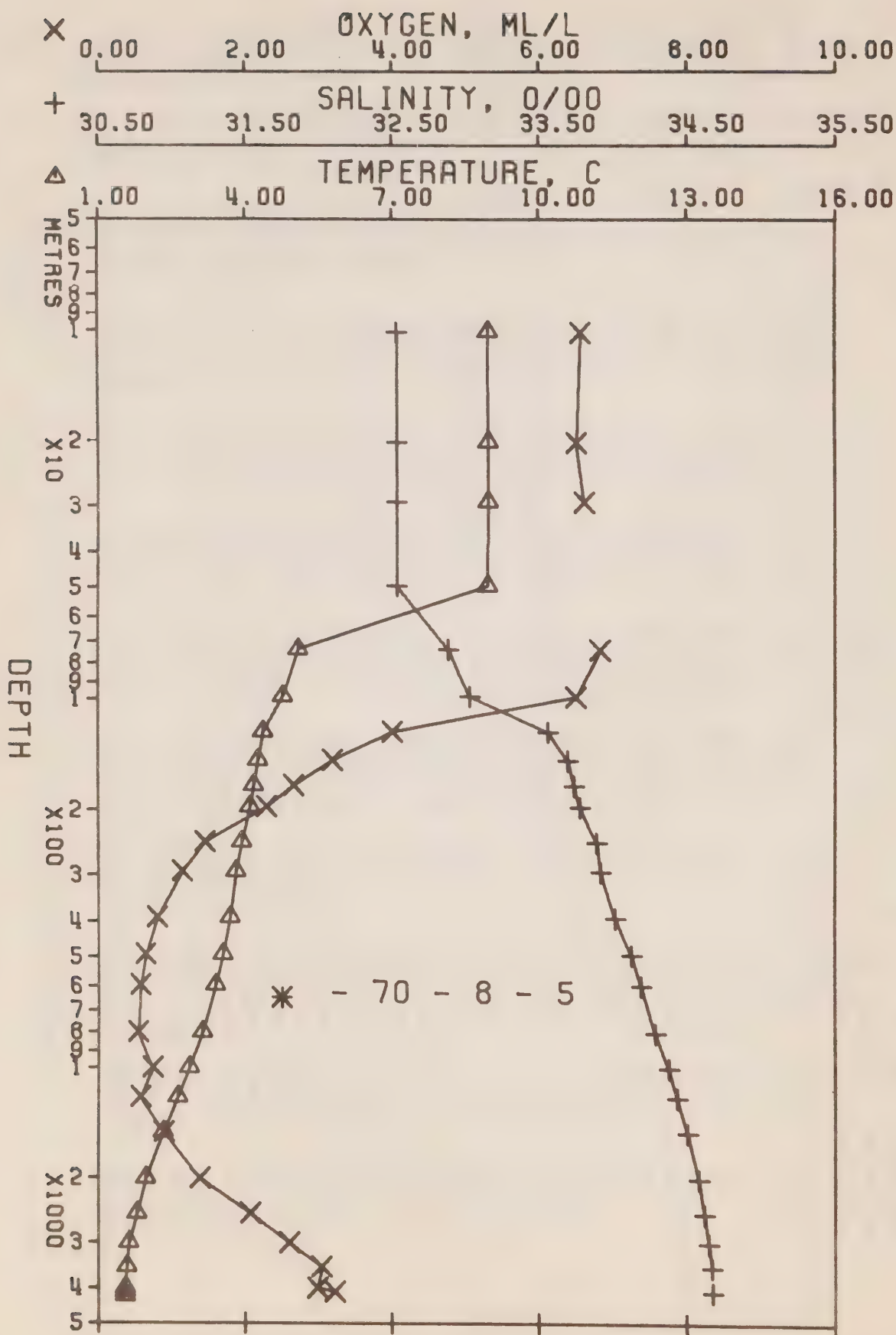
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA C	POT. EN	OXY	SOUND
0	9.48	32.530	0	25.134	284.1	9.48	283.9	0.0	0.0	6.43	1485.
404	3.63	34.052	401	27.094	101.1	3.60	97.5	7.40	8.81	0.68	1471.
505	3.50	34.147	501	27.183	93.4	3.47	89.1	8.37	13.36	0.59	1472.
606	3.38	34.217	601	27.250	87.7	3.34	82.7	9.28	18.53	0.53	1473.
808	3.08	34.321	801	27.361	78.2	3.02	72.0	10.95	30.57	0.51	1475.
1011	2.82	34.394	1001	27.443	71.2	2.75	64.2	12.46	44.55	0.83	1478.
1214	2.56	34.451	1202	27.511	65.3	2.48	57.6	13.85	60.27	0.58	1480.
1519	2.29	34.513	1502	27.583	59.3	2.19	50.7	15.73	86.54	0.90	1484.
2028	1.95	34.584	2003	27.667	52.3	1.81	42.5	18.55	137.48	1.31	1491.
2538	1.73	34.629	2504	27.720	48.0	1.55	37.2	21.09	196.66	2.20	1499.
3050	1.60	34.654	3006	27.750	46.1	1.37	34.2	23.49	265.02	2.61	1507.
3564	1.54	34.670	3508	27.767	45.5	1.26	32.2	25.84	344.05	2.97	1515.
4081	1.54	34.678	4012	27.773	46.4	1.21	31.2	28.22	436.90	2.98	1524.
4185	1.52	34.681	4113	27.777	46.1	1.18	30.8	28.70	457.10	3.16	1526.





PACIFIC OCEANOGRAPHIC GROUP  
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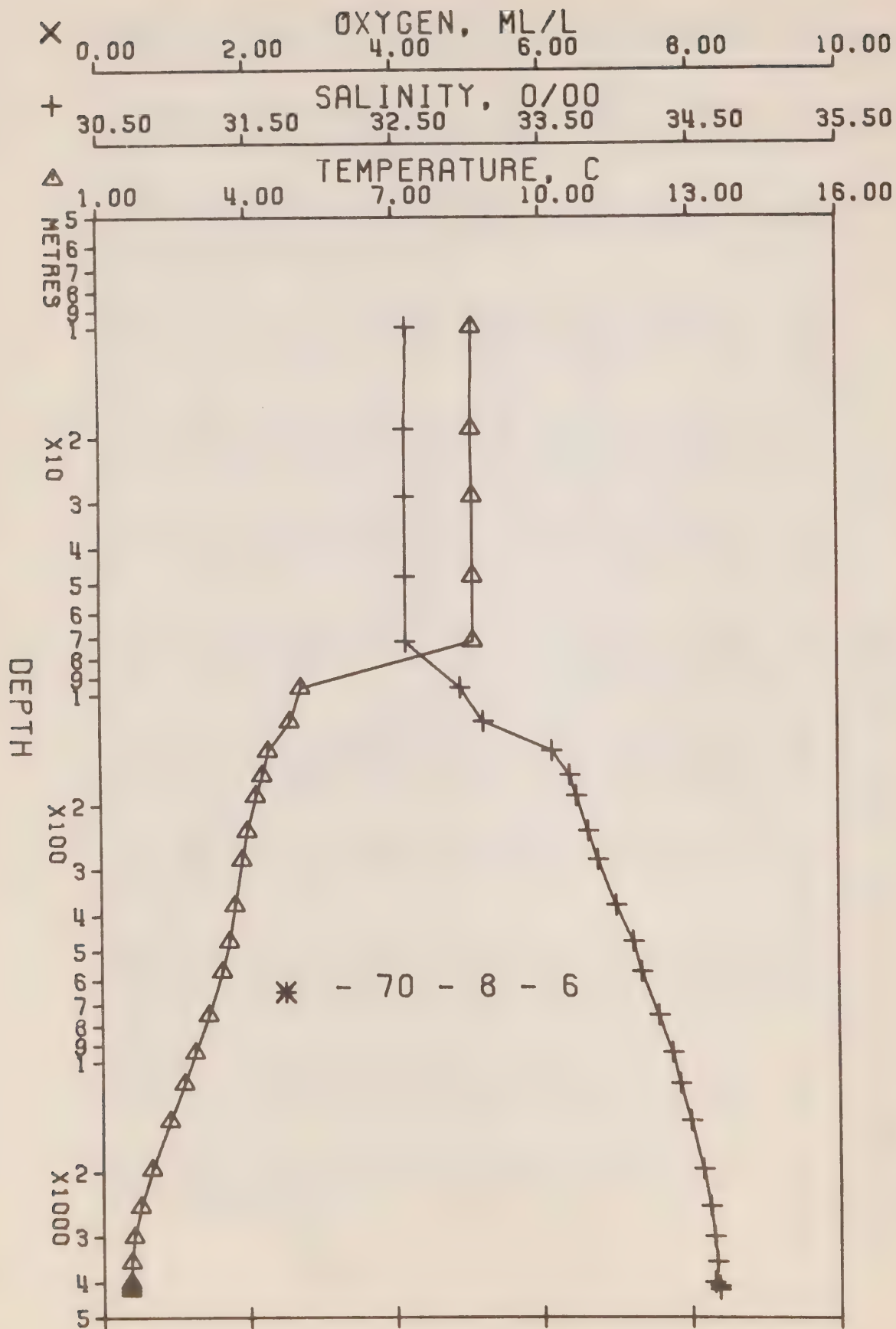
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0	9.44	32.544	0	25.152	282.5	9.44	282.3	0.0	0.0	6.43	1485.
10	9.39	32.542	10	25.158	282.0	9.39	281.6	0.28	0.01	6.41	1485.
20	9.39	32.542	20	25.158	282.2	9.39	281.6	0.57	0.06	6.38	1485.
30	9.39	32.541	30	25.157	282.5	9.39	281.6	0.85	0.13	6.40	1485.
50	9.38	32.541	50	25.159	282.7	9.37	281.5	1.43	0.37	6.40	1485.
75	5.43	32.887	75	25.971	205.4	5.48	204.3	2.04	0.76	6.66	1471.
101	4.94	32.952	100	26.085	194.7	4.93	193.4	2.54	1.20	6.71	1470.
126	4.73	33.164	125	26.276	176.8	4.72	175.3	3.01	1.75	5.95	1469.
151	4.32	33.623	150	26.684	138.3	4.31	136.6	3.41	2.30	3.60	1469.
176	4.16	33.719	175	26.777	129.6	4.15	127.8	3.74	2.86	2.68	1469.
201	4.07	33.778	200	26.833	124.5	4.06	122.5	4.06	3.48	2.23	1469.
252	3.91	33.850	250	26.906	117.8	3.89	115.5	4.67	4.83	1.47	1469.
302	3.82	33.915	300	26.967	112.5	3.80	109.7	5.25	6.52	1.19	1470.
403	3.58	34.021	400	27.065	103.9	3.65	100.3	6.34	10.44	0.81	1471.
504	3.56	34.128	500	27.162	95.4	3.53	91.1	7.34	15.09	0.67	1472.
605	3.41	34.197	600	27.231	89.5	3.37	84.4	8.27	20.36	0.55	1473.
807	3.07	34.324	800	27.364	77.8	3.02	71.7	9.96	32.47	0.60	1475.
1010	2.83	34.392	1000	27.440	71.5	2.76	64.4	11.46	46.41	0.63	1478.
1213	2.57	34.447	1201	27.507	65.7	2.49	58.0	12.86	62.22	0.65	1480.
1518	2.30	34.512	1501	27.581	59.4	2.20	50.3	14.75	88.60	0.90	1484.
2027	1.96	34.585	2002	27.667	52.3	1.82	42.5	17.57	139.53	1.48	1491.
2537	1.74	34.624	2503	27.715	48.5	1.56	37.7	20.13	199.04	2.23	1499.
3049	1.60	34.650	3004	27.746	46.3	1.37	34.4	22.54	267.79	2.85	1507.
3561	1.54	34.668	3505	27.765	45.7	1.26	32.4	24.89	346.95	3.28	1515.
4074	1.53	34.675	4005	27.772	46.4	1.20	31.4	27.26	439.05	3.38	1524.
4176	1.52	34.679	4105	27.775	46.2	1.18	30.9	27.73	450.00	3.32	1526.
4279	1.53	34.664	4205	27.763	47.7	1.17	32.1	28.21	479.75	0.0	1528.





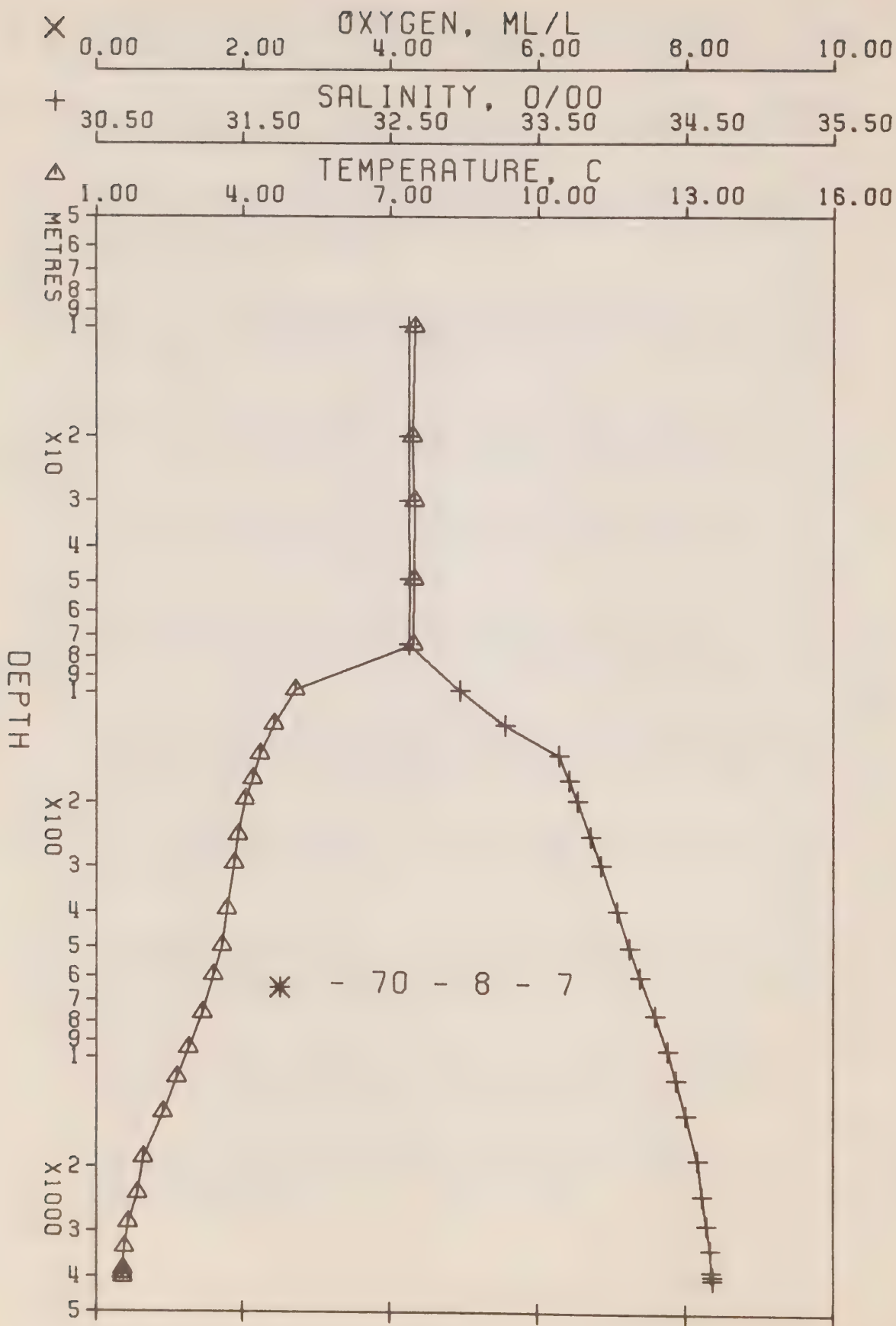
PACIFIC OCEANOGRAPHIC GROUP  
REFERENCE NO. 70- 8- 5 DATE 16/11/70  
POSITION 50- 6.0 N. 145- 0.0 W GMT 18.5  
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA n	PCT. EN	OXY	SOUND
0	9.02	32.542	0	25.217	276.3	9.02	276.1	0.0	0.0	6.62	1484.
10	8.97	32.542	10	25.224	275.8	8.97	275.4	0.28	0.01	6.57	1484.
20	8.93	32.542	20	25.223	276.0	8.98	275.5	0.56	0.06	6.52	1484.
29	8.98	32.541	29	25.222	276.3	8.98	275.6	0.81	0.12	6.63	1484.
49	8.97	32.542	49	25.224	276.4	8.96	275.3	1.37	0.35	0.0	1484.
73	5.08	32.895	73	26.024	200.2	5.07	199.2	1.95	0.70	6.84	1470.
99	4.76	33.040	98	26.175	186.2	4.75	185.0	2.43	1.13	6.51	1469.
123	4.36	33.570	122	26.637	142.4	4.35	141.0	2.83	1.57	4.01	1468.
147	4.25	33.703	146	26.754	131.5	4.24	129.9	3.15	2.02	3.19	1469.
172	4.17	33.746	171	26.797	127.7	4.16	125.9	3.48	2.55	2.66	1469.
196	4.00	33.785	195	26.836	124.2	4.08	122.1	3.78	3.12	2.29	1469.
246	3.92	33.901	244	26.946	114.1	3.90	111.7	4.37	4.45	1.45	1469.
295	3.81	33.925	293	26.976	111.6	3.79	108.8	4.92	5.98	1.14	1469.
395	3.69	34.023	392	27.065	103.8	3.66	100.2	6.00	9.77	0.80	1471.
498	3.53	34.133	494	27.169	94.7	3.50	90.4	7.02	14.42	0.64	1472.
604	3.38	34.202	599	27.238	88.7	3.34	83.8	7.99	19.87	0.57	1473.
809	3.12	34.294	802	27.336	80.6	3.06	74.4	9.73	32.37	0.54	1475.
1012	2.85	34.386	1002	27.433	72.1	2.78	65.1	11.27	46.67	0.74	1478.
1215	2.60	34.439	1203	27.498	66.6	2.52	58.9	12.63	62.66	0.57	1480.
1521	2.30	34.503	1504	27.578	59.8	2.20	51.1	14.60	89.46	0.89	1484.
2030	1.94	34.583	2005	27.667	52.2	1.80	42.5	17.42	140.46	1.38	1491.
2540	1.77	34.618	2506	27.703	49.4	1.59	38.3	20.00	200.64	2.07	1499.
3052	1.50	34.649	3007	27.746	46.4	1.37	34.5	22.44	270.20	2.60	1507.
3564	1.55	34.668	3508	27.764	45.8	1.27	32.5	24.79	349.55	3.04	1515.
4079	1.53	34.676*	4010	27.772	46.3	1.20	31.4	27.16	441.82	2.98	1524.
4182	1.52	34.676	4110	27.773	46.4	1.18	31.2	27.64	461.85	3.22	1526.
4284	1.53	34.676*	4210	27.773	46.9	1.17	31.2	28.11	482.51	0.0	1528.



PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 70- 8- 6 DATE 24/11/70  
 POSITION 50- 3.0 N. 145- 3.0 W GMT 18.5  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. FN	OMY	SOUND
0	8.63	32.580	0	25.306	267.8	8.63	267.6	0.0	0.0	0.0	1482.
10	8.60	32.596	10	25.323	266.3	8.60	265.9	0.27	0.01	0.0	1482.
19	8.59	32.581	19	25.313	267.5	8.59	266.8	0.51	0.05	0.0	1482.
29	8.60	32.578	29	25.309	268.0	8.60	267.2	0.78	0.12	0.0	1483.
48	8.60	32.579	48	25.310	268.2	8.59	267.1	1.29	0.32	0.0	1483.
72	8.60	32.579	72	25.310	268.6	8.59	267.1	1.95	0.73	0.0	1483.
97	5.08	32.953	96	26.070	196.1	5.07	194.9	2.51	1.21	0.0	1470.
120	4.85	33.110	119	26.220	182.1	4.84	180.6	2.95	1.69	0.0	1470.
144	4.40	33.576	143	26.638	142.6	4.39	140.9	3.34	2.21	0.0	1469.
167	4.28	33.696	166	26.746	132.6	4.27	130.7	3.65	2.71	0.0	1469.
190	4.15	33.741	189	26.795	128.0	4.14	126.0	3.96	3.26	0.0	1469.
238	3.97	33.821	236	26.877	120.6	3.95	118.2	4.54	4.54	0.0	1469.
284	3.87	33.887	282	26.939	114.9	3.85	112.2	5.09	5.90	0.0	1469.
379	3.72	34.003	376	27.047	105.5	3.69	102.0	6.13	9.52	0.0	1471.
475	3.59	34.119	471	27.152	96.2	3.56	92.1	7.10	13.71	0.0	1472.
574	3.44	34.175	569	27.211	91.2	3.40	86.4	8.02	18.66	0.0	1473.
755	3.16	34.292	748	27.330	80.8	3.11	75.0	9.58	29.18	0.0	1475.
953	2.88	34.380	944	27.426	72.5	2.82	65.8	11.09	42.35	0.0	1477.
1156	2.65	34.430	1144	27.486	67.5	2.57	60.0	12.50	57.55	0.0	1479.
1464	2.35	34.499	1448	27.567	60.7	2.25	52.2	14.48	83.86	0.0	1483.
1988	1.97	34.578	1964	27.661	52.7	1.83	43.1	17.42	135.72	0.0	1490.
2519	1.73	34.625	2485	27.717	48.2	1.55	37.6	20.08	196.76	0.0	1498.
3050	1.60	34.648	3005	27.745	46.5	1.37	34.6	22.58	267.79	0.0	1507.
3572	1.54	34.666	3516	27.764	45.8	1.26	32.5	24.98	348.69	0.0	1515.
4080	1.53	34.646	4011	27.748	48.4	1.20	33.6	27.43	444.68	0.0	1524.
4180	1.52	34.678	4108	27.775	46.3	1.18	31.0	27.90	464.49	0.0	1526.
4277	1.53	34.680	4203	27.776	46.6	1.17	30.9	28.35	483.58	0.0	1529.



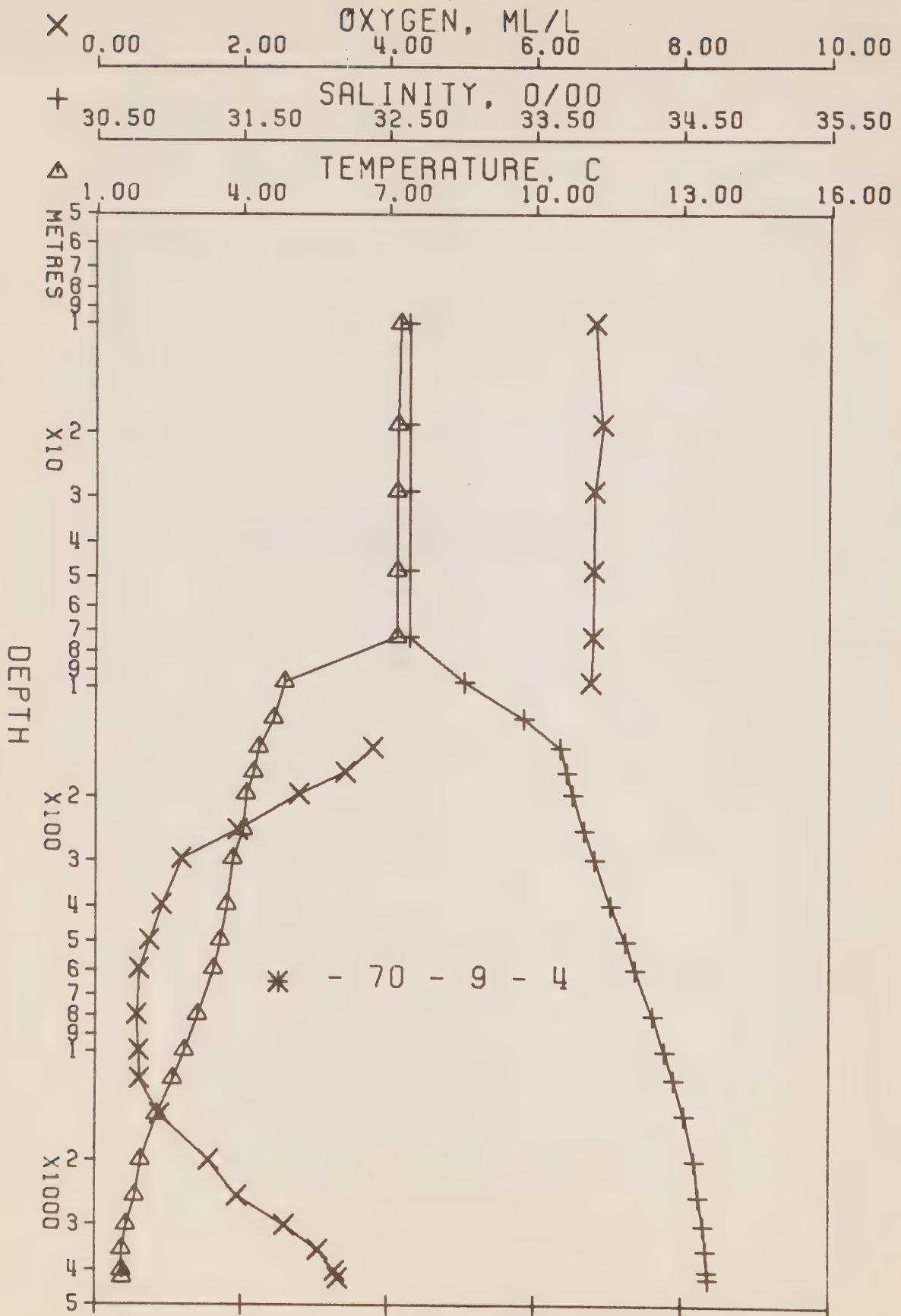


PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 70- 8- 7 DATE 3/12/70  
 POSITION 50- 0.0 N. 144-59.0 W GMT 18.7  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
0	7.55	32.631	0	25.504	249.0	7.55	248.8	0.0	0.0	0.0	1478.
10	7.50	32.631	10	25.511	248.4	7.50	248.1	0.25	0.01	0.0	1478.
20	7.45	32.629	20	25.516	248.1	7.45	247.5	0.50	0.05	0.0	1478.
30	7.49	32.630	30	25.512	248.7	7.49	248.0	0.75	0.12	0.0	1478.
49	7.48	32.634	49	25.516	248.5	7.48	247.5	1.23	0.31	0.0	1479.
74	7.47	32.630	74	25.514	249.1	7.46	247.7	1.86	0.71	0.0	1479.
100	5.07	32.982	99	26.094	193.9	5.06	192.6	2.42	1.21	0.0	1470.
124	4.63	33.283	123	26.381	166.8	4.62	165.3	2.85	1.70	0.0	1469.
149	4.35	33.648	148	26.700	136.7	4.34	135.0	3.23	2.22	0.0	1469.
174	4.20	33.720	173	26.773	130.0	4.19	128.1	3.57	2.77	0.0	1469.
198	4.04	33.774	197	26.833	124.5	4.03	122.5	3.87	3.36	0.0	1469.
249	3.90	33.864	247	26.918	116.7	3.88	114.3	4.48	4.74	0.0	1463.
298	3.82	33.934	296	26.982	111.0	3.80	108.3	5.04	6.31	0.0	1470.
399	3.67	34.043	396	27.083	102.2	3.64	98.6	6.11	10.12	0.0	1471.
501	3.56	34.124	497	27.159	95.8	3.53	91.4	7.12	14.74	0.0	1472.
604	3.39	34.194	599	27.231	89.5	3.25	84.5	8.07	20.11	0.0	1473.
768	3.16	34.295	761	27.333	80.7	3.11	74.7	9.46	29.83	0.0	1475.
959	2.87	34.381	950	27.428	72.5	2.81	65.6	10.92	42.67	0.0	1477.
1151	2.63	34.436	1139	27.493	66.8	2.55	59.4	12.25	56.96	0.0	1479.
1438	2.35	34.498	1422	27.566	60.7	2.25	52.3	14.07	81.02	0.0	1483.
1918	1.94	34.592	1895	27.666	51.8	1.81	42.7	16.75	126.65	0.0	1489.
2403	1.82	34.611	2371	27.699	50.0	1.65	39.3	19.20	180.75	0.0	1497.
2892	1.63	34.642	2851	27.738	46.8	1.42	35.3	21.57	244.59	0.0	1504.
3390	1.56	34.663	3338	27.760	45.8	1.30	33.0	23.86	318.11	0.0	1512.
3898	1.53	34.670	3834	27.768	46.3	1.22	31.9	26.22	405.81	0.0	1521.
4001	1.51	34.680	3934	27.777	45.5	1.19	30.9	26.69	424.73	0.0	1523.
4104	1.53	34.680	4034	27.776	46.2	1.19	31.0	27.15	444.13	0.0	1525.



RESULTS OF NANSEN BOTTLE CASTS  
(P-70-9)

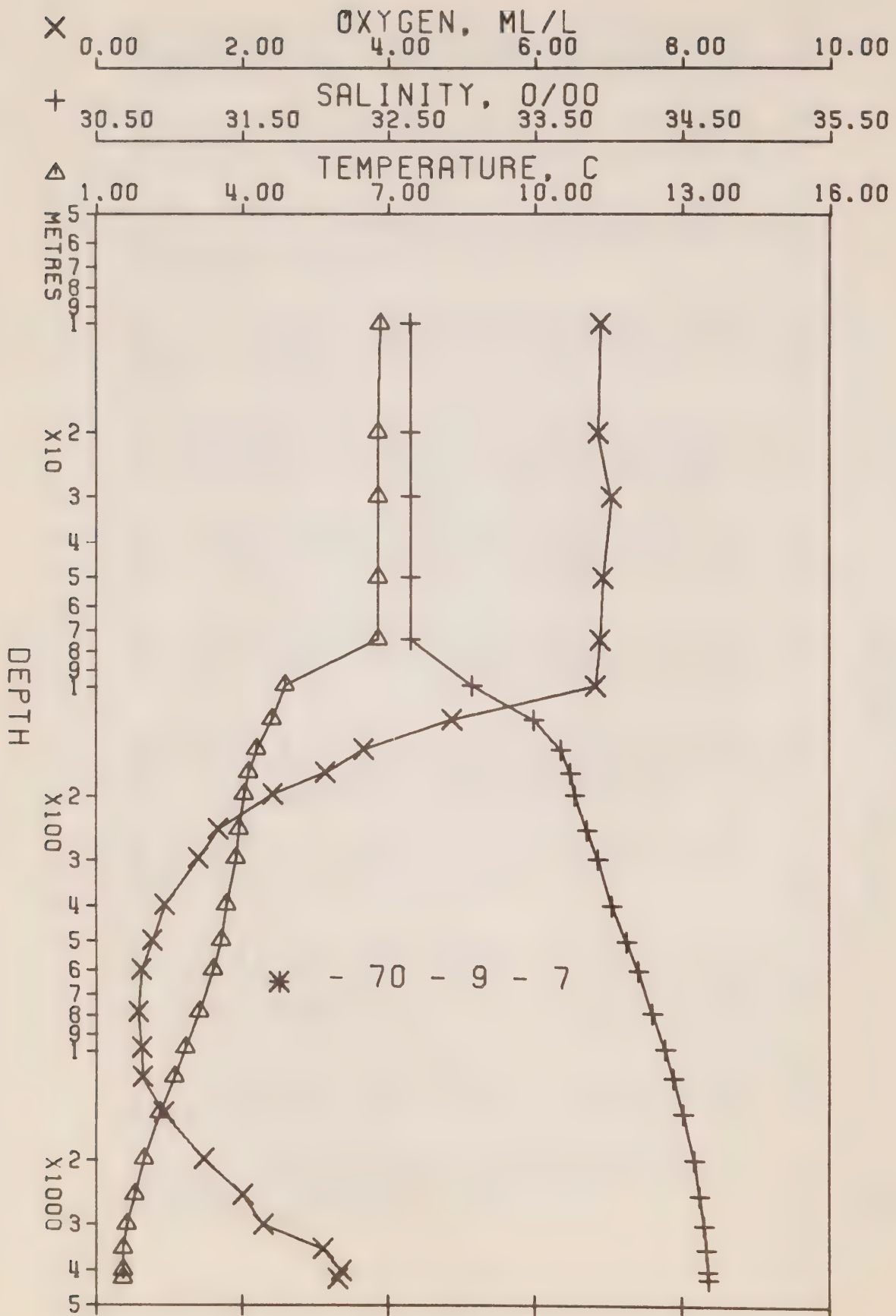




## PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 4 DATE 10/12/70  
 POSITION 50- 0.0 N, 145- 0.0 W GMT 19.7  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.21	32.644	0	25.561	243.6	7.21	243.4	0.0	0.0	0.0	1477.
10	7.22	32.646	10	25.561	243.6	7.22	243.3	0.25	0.01	6.82	1477.
19	7.18	32.644	19	25.565	243.4	7.18	242.9	0.47	0.05	6.92	1477.
29	7.17	32.647	29	25.569	243.2	7.17	242.5	0.71	0.11	6.81	1477.
48	7.17	32.645	48	25.568	243.6	7.17	242.6	1.18	0.29	6.80	1477.
73	7.17	32.643	73	25.566	244.1	7.16	242.8	1.80	0.68	6.79	1478.
98	4.86	33.025	97	26.152	188.3	4.85	187.2	2.33	1.13	6.76	1469.
123	4.63	33.429	122	26.497	155.8	4.62	154.4	2.75	1.62	0.0	1469.
148	4.33	33.679	147	26.727	134.1	4.32	132.5	3.11	2.11	3.79	1469.
173	4.23	33.725	172	26.774	129.9	4.22	128.1	3.44	2.65	3.41	1469.
198	4.08	33.763	197	26.820	125.7	4.07	123.7	3.77	3.26	2.78	1469.
249	4.01	33.844	247	26.891	119.3	3.99	116.8	4.38	4.67	1.94	1469.
299	3.80	33.913	297	26.967	112.4	3.78	109.6	4.97	6.30	1.17	1469.
400	3.68	34.025	397	27.068	103.6	3.65	100.0	6.05	10.17	0.90	1471.
501	3.55	34.123	497	27.159	95.7	3.52	91.4	7.06	14.79	0.73	1472.
600	3.41	34.192	595	27.227	89.8	3.37	84.8	7.97	19.94	0.59	1473.
802	3.09	34.310	795	27.351	79.1	3.04	73.0	9.68	32.09	0.56	1475.
1006	2.82	34.392	996	27.441	71.4	2.75	64.3	11.20	46.14	0.59	1478.
1208	2.57	34.448	1196	27.507	65.6	2.49	58.0	12.58	61.77	0.60	1480.
1515	2.25	34.519	1498	27.591	58.3	2.15	50.0	14.47	87.99	0.88	1484.
2028	1.92	34.590	2003	27.674	51.4	1.78	41.8	17.25	138.12	1.55	1491.
2542	1.79	34.616	2508	27.705	49.8	1.61	38.6	19.84	198.63	1.94	1499.
3058	1.61	34.648	3013	27.744	46.7	1.58	34.7	22.33	269.45	2.59	1507.
3574	1.53	34.666	3518	27.764	45.7	1.25	32.5	24.70	349.78	3.05	1515.
4089	1.53	34.676	4020	27.772	46.4	1.20	31.3	27.07	442.09	3.28	1524.
4295	1.54	34.679	4220	27.774	46.8	1.18	31.0	28.02	482.97	3.32	1528.



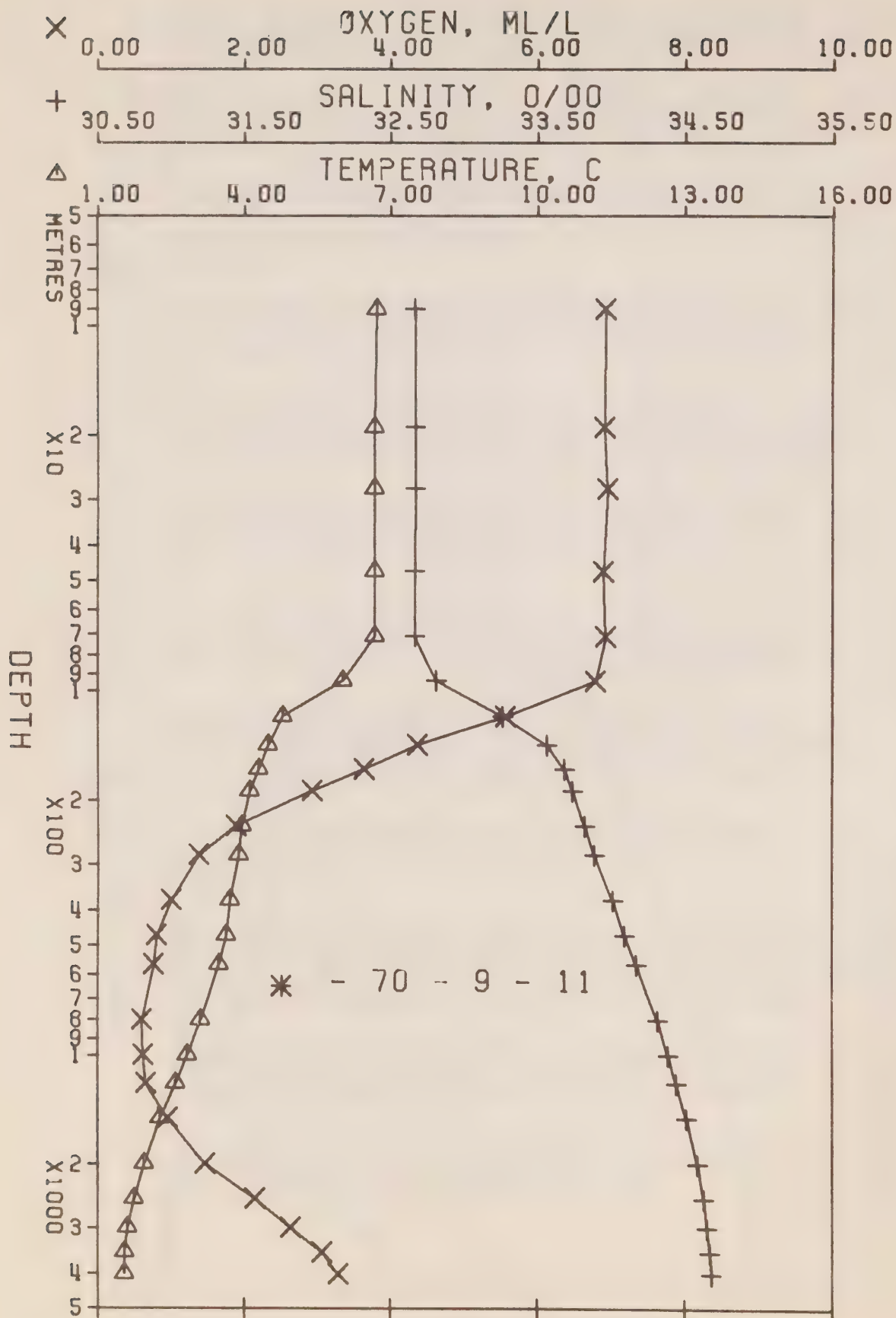
PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 7 DATE 17/12/70

POSITION 50- 0.0 N, 145- 0.0 W GMT 19.7

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.87	32.651*	0	25.612	238.7	6.87	238.5	0.0	0.0	6.96	1475.
10	6.82	32.654	10	25.621	237.9	6.82	237.6	0.24	0.01	6.89	1475.
20	6.78	32.657	20	25.629	237.3	6.78	236.8	0.48	0.05	6.86	1475.
30	6.77	32.655	30	25.629	237.5	6.77	236.8	0.72	0.11	7.04	1476.
50	6.78	32.656	50	25.628	237.8	6.78	236.9	1.20	0.31	6.92	1476.
74	6.77	32.656	74	25.630	238.0	6.76	236.7	1.78	0.68	6.88	1476.
100	4.96	33.074	99	26.190	184.7	4.85	183.5	2.32	1.15	6.82	1469.
124	4.59	33.493	123	26.552	150.6	4.58	149.1	2.72	1.61	4.88	1469.
149	4.27	33.680	148	26.734	133.5	4.26	131.9	3.07	2.10	3.66	1469.
173	4.11	33.744	172	26.801	127.2	4.10	125.4	3.38	2.61	3.13	1468.
198	4.01	33.775	197	26.836	124.1	4.00	122.1	3.70	3.21	2.41	1468.
248	3.91	33.861	246	26.915	117.0	3.89	114.6	4.29	4.57	1.66	1469.
298	3.85	33.935	296	26.980	111.3	3.83	108.4	4.87	6.17	1.39	1470.
400	3.66	34.028	397	27.072	103.2	3.63	99.6	5.96	10.05	0.93	1471.
501	3.55	34.131	497	27.165	95.1	3.52	90.7	6.96	14.64	0.76	1472.
602	3.38	34.208	597	27.243	88.3	3.34	83.3	7.88	19.84	0.61	1473.
790	3.10	34.306	783	27.347	79.4	3.05	73.4	9.45	30.98	0.57	1475.
991	2.82	34.389	981	27.439	71.5	2.75	64.6	10.96	44.64	0.62	1477.
1192	2.59	34.443	1180	27.502	66.1	2.51	58.6	12.34	60.03	0.63	1480.
1495	2.29	34.509	1479	27.580	59.4	2.19	51.0	14.24	86.01	0.92	1483.
2007	1.96	34.586	1982	27.668	52.1	1.82	42.5	17.06	136.35	1.47	1491.
2520	1.76	34.618	2486	27.709	49.2	1.58	38.3	19.65	196.10	2.00	1498.
3037	1.60	34.649	2993	27.746	46.4	1.37	34.5	22.11	265.88	2.28	1507.
3555	1.53	34.667	3499	27.765	45.6	1.25	32.4	24.48	345.53	3.10	1515.
4074	1.52	34.676	4005	27.773	46.1	1.19	31.3	26.85	437.74	3.35	1524.
4281	1.53	34.679	4207	27.775	46.7	1.17	30.9	27.81	478.74	3.30	1528.





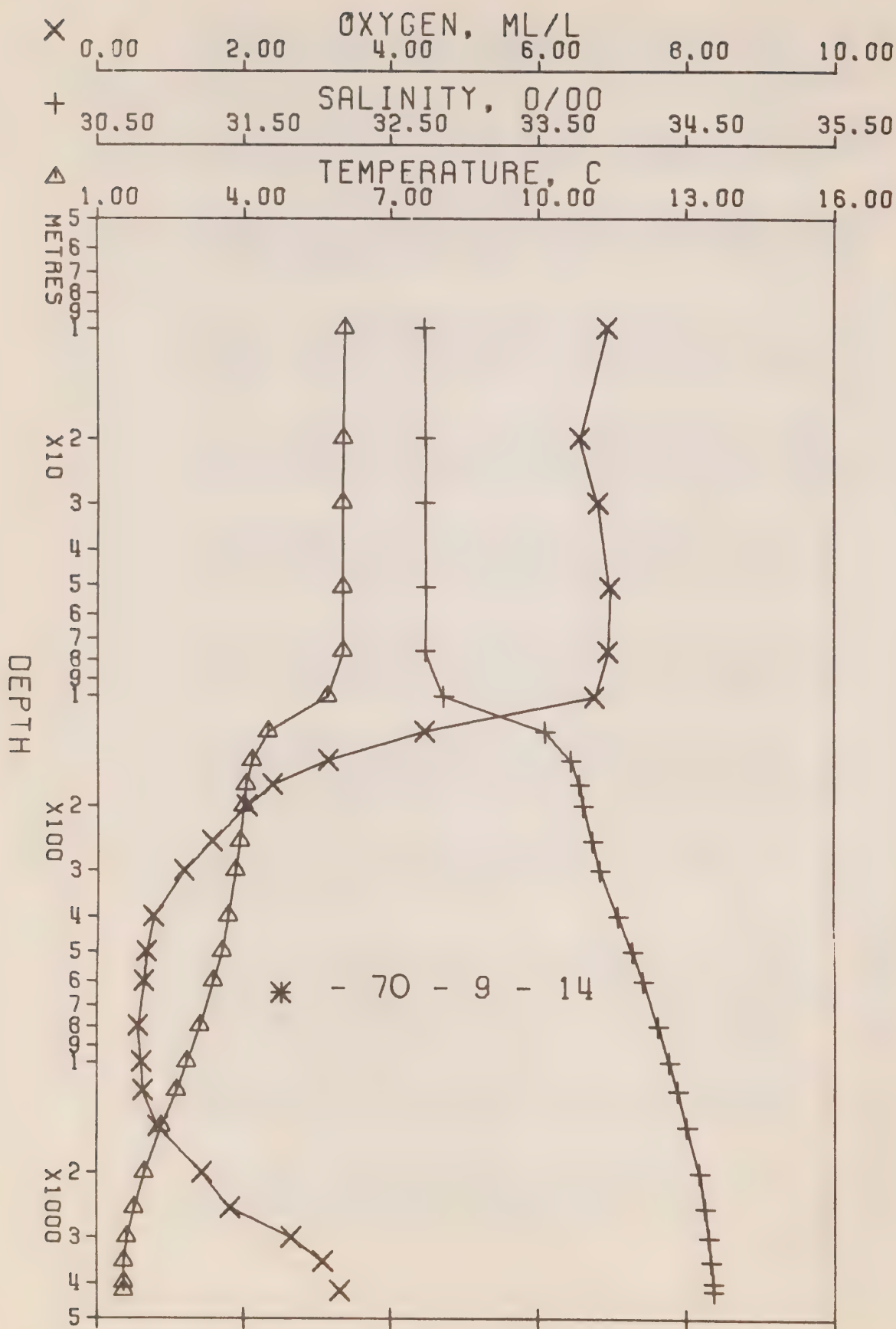
PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 11 DATE 23/12/70

POSITION 50- 0.0 N, 145- 0.0 W GMT 19.7

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
0	6.71	32.674	0	25.652	235.0	6.71	234.7	0.0	0.0	6.92	1475.
9	6.70	32.670	9	25.650	235.3	6.70	234.9	0.21	0.01	6.92	1475.
19	6.66	32.668	19	25.653	235.0	6.66	234.6	0.45	0.04	6.91	1475.
28	6.65	32.668	28	25.655	235.0	6.65	234.4	0.66	0.10	6.95	1475.
47	6.66	32.667	47	25.653	235.5	6.66	234.6	1.11	0.27	6.89	1475.
71	6.65	32.665	71	25.652	235.8	6.64	234.6	1.68	0.62	6.92	1476.
95	5.99	32.814	94	25.853	216.8	5.98	215.4	2.21	1.06	6.78	1474.
119	4.76	33.264	118	26.352	169.6	4.75	168.2	2.68	1.57	5.56	1470.
142	4.47	33.565	141	26.622	144.1	4.46	142.4	3.04	2.05	4.36	1469.
165	4.27	33.687	164	26.740	133.1	4.26	131.3	3.36	2.55	3.63	1469.
189	4.09	33.739	188	26.800	127.5	4.08	125.6	3.67	3.11	2.92	1469.
237	3.92	33.827	235	26.887	119.6	3.90	117.3	4.26	4.38	1.88	1469.
284	3.87	33.891	282	26.943	114.7	3.85	112.0	4.81	5.85	1.37	1469.
379	3.69	34.013	376	27.058	104.5	3.66	101.0	5.85	9.36	0.99	1470.
473	3.61	34.094	469	27.130	98.3	3.58	94.1	6.80	13.48	0.79	1472.
568	3.46	34.175	563	27.209	91.4	3.42	86.6	7.70	18.26	0.75	1473.
806	3.08	34.320	799	27.360	78.2	3.03	72.1	9.70	32.29	0.59	1475.
1007	2.82	34.392	997	27.441	71.4	2.75	64.3	11.20	46.09	0.61	1478.
1207	2.58	34.445	1195	27.504	65.9	2.50	58.3	12.57	61.61	0.65	1480.
1509	2.26	34.514	1492	27.586	58.8	2.16	50.4	14.44	87.50	0.95	1484.
2012	1.93	34.591	1987	27.674	51.4	1.79	41.8	17.18	136.67	1.46	1491.
2518	1.72	34.628	2494	27.720	47.9	1.54	37.2	19.68	194.33	2.14	1498.
3029	1.59	34.652	2985	27.749	46.0	1.37	34.3	22.07	261.95	2.63	1506.
3547	1.53	34.668	3491	27.766	45.5	1.25	32.3	24.43	341.09	3.06	1515.
4075	1.52	34.678	4006	27.775	46.1	1.19	31.1	26.84	434.89	3.28	1524.



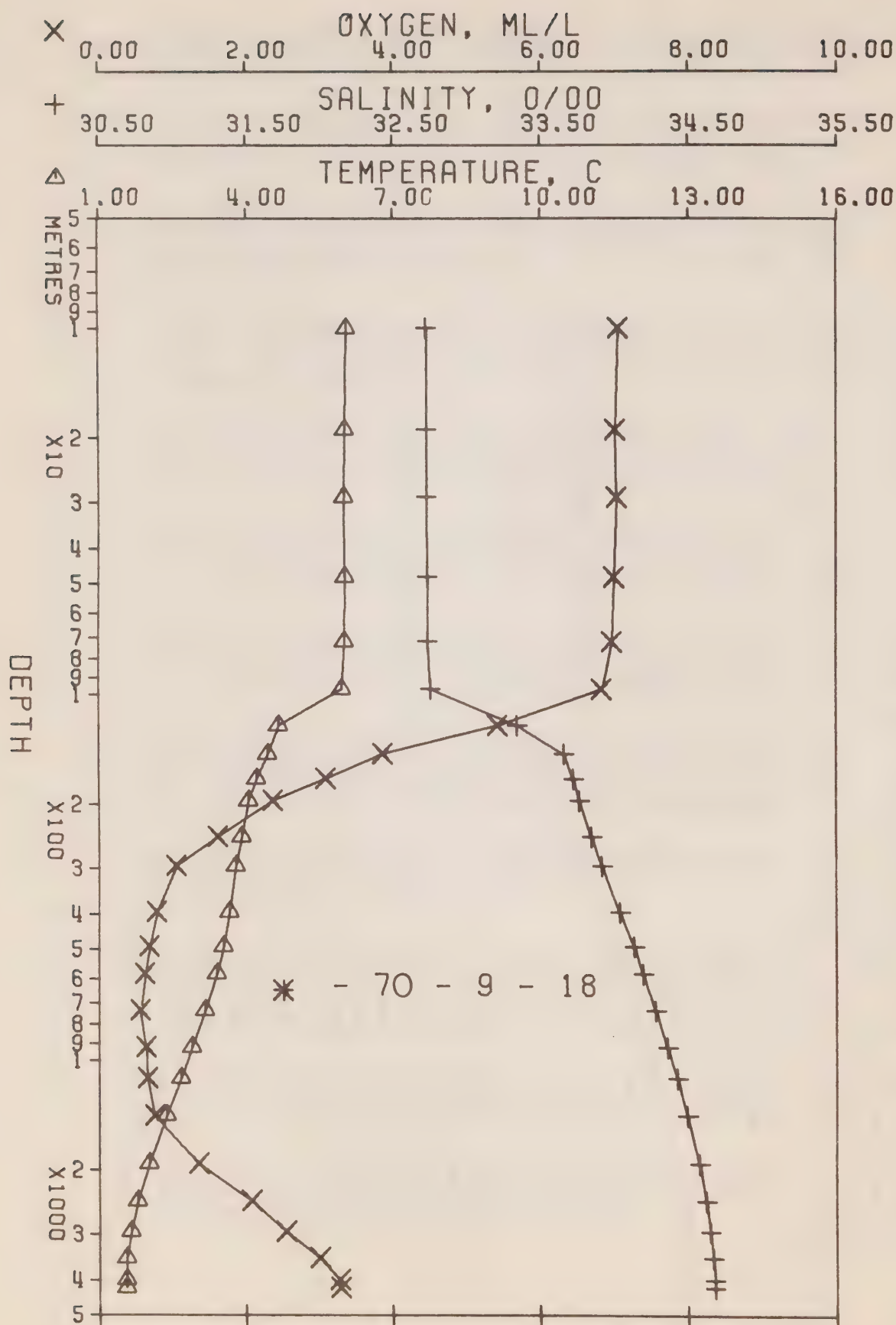
## PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 14 DATE 1/ 1/71

POSITION 50- 0.0 N. 145- 0.0 W GMT 10.5

## HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.03	32.737	0	25.788	222.0	6.03	221.8	0.0	0.0	6.95	1472.
10	6.04	32.734	10	25.784	222.5	6.04	222.1	0.22	0.01	6.94	1472.
20	6.01	32.738	20	25.791	221.9	6.01	221.5	0.45	0.05	6.57	1472.
30	6.00	32.737	30	25.791	222.0	6.00	221.4	0.67	0.10	6.82	1473.
51	6.00	32.738	51	25.792	222.1	6.00	221.3	1.14	0.30	6.98	1473.
76	6.00	32.735	76	25.790	222.7	5.99	221.5	1.70	0.66	6.95	1473.
102	5.68	32.863	101	25.929	209.6	5.67	208.2	2.26	1.17	6.77	1473.
127	4.46	33.553	126	26.613	144.7	4.45	143.3	2.70	1.68	4.46	1469.
152	4.13	33.729	151	26.788	128.4	4.12	126.8	3.04	2.16	3.14	1468.
177	4.02	33.790	176	26.847	122.9	4.01	121.1	3.35	2.69	2.38	1463.
202	3.97	33.815	201	26.872	120.7	3.96	118.7	3.66	3.28	2.03	1468.
253	3.90	33.882	251	26.932	115.4	3.88	113.0	4.25	4.67	1.56	1469.
303	3.80	33.932	301	26.982	111.1	3.78	108.2	4.82	6.28	1.17	1470.
404	3.66	34.049	401	27.089	101.6	3.63	98.0	5.90	10.15	0.75	1471.
505	3.53	34.143	501	27.177	94.0	3.50	89.6	6.88	14.72	0.66	1472.
607	3.36	34.217	602	27.252	87.5	3.32	82.5	7.81	19.96	0.63	1473.
804	3.09	34.315	797	27.355	78.7	3.04	72.6	9.44	31.70	0.55	1475.
1007	2.82	34.391	997	27.440	71.4	2.75	64.4	10.95	45.67	0.60	1478.
1208	2.60	34.443	1196	27.501	66.3	2.52	58.6	12.34	61.31	0.62	1480.
1513	2.29	34.506	1496	27.577	59.8	2.19	51.2	14.25	87.84	0.83	1484.
2021	1.95	34.590	1996	27.672	51.8	1.81	42.0	17.06	138.37	1.43	1491.
2530	1.73	34.626	2496	27.717	48.2	1.55	37.5	19.59	197.09	1.81	1499.
3039	1.59	34.649	2995	27.746	46.2	1.36	34.4	21.98	265.16	2.64	1507.
3550	1.52	34.667	3494	27.766	45.4	1.24	32.3	24.32	343.43	3.07	1515.
4059	1.52	34.678	3991	27.775	46.0	1.19	31.1	26.64	433.44	0.0	1524.
4263	1.53	34.679	4189	27.775	46.7	1.18	30.9	27.58	473.39	3.30	1527.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 18 DATE 7/ 1/71

POSITION 50- 0.0 N, 145- 0.0 W GMT 19.7

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.05	32.741	0	25.788	221.9	6.05	221.7	0.0	0.0	7.03	1472.
10	6.04	32.736	10	25.786	222.3	6.04	222.0	0.22	0.01	7.06	1472.
19	6.01	32.737	19	25.790	222.0	6.01	221.5	0.42	0.04	7.02	1472.
29	6.00	32.737	29	25.791	222.0	6.00	221.4	0.65	0.10	7.04	1473.
48	6.01	32.738	48	25.791	222.3	6.01	221.4	1.07	0.26	7.00	1473.
72	5.99	32.740	72	25.795	222.2	5.98	221.1	1.61	0.59	6.97	1473.
98	5.93	32.759	97	25.817	220.3	5.92	218.9	2.18	1.09	6.83	1473.
123	4.65	33.350	122	26.432	162.0	4.64	160.5	2.66	1.63	5.42	1469.
147	4.42	33.666	146	26.707	136.0	4.41	134.4	3.01	2.11	3.86	1469.
172	4.20	33.728	171	26.779	129.3	4.19	127.5	3.35	2.65	3.08	1469.
197	4.03	33.771	196	26.831	124.6	4.02	122.6	3.66	3.26	2.36	1469.
248	3.89	33.855	246	26.912	117.3	3.87	114.9	4.27	4.64	1.61	1469.
298	3.77	33.925	296	26.980	111.2	3.75	108.4	4.85	6.24	1.04	1469.
398	3.64	34.044	395	27.087	101.8	3.61	98.2	5.91	10.00	0.77	1471.
495	3.52	34.139	491	27.174	94.1	3.49	89.9	6.86	14.32	0.67	1472.
588	3.38	34.199	583	27.236	88.9	3.34	84.0	7.71	19.01	0.61	1473.
739	3.15	34.286	732	27.326	81.1	3.10	75.4	8.98	27.64	0.55	1474.
932	2.88	34.364	923	27.413	73.6	2.82	67.0	10.47	40.33	0.63	1477.
1128	2.65	34.428	1117	27.485	67.5	2.57	60.2	11.86	54.85	0.65	1479.
1428	2.35	34.495	1413	27.564	60.8	2.25	52.6	13.77	79.84	0.75	1483.
1940	1.99	34.574	1917	27.656	53.1	1.86	43.6	16.66	129.45	1.35	1490.
2464	1.75	34.620	2431	27.711	48.7	1.58	38.1	19.31	188.80	2.07	1497.
2993	1.61	34.647	2950	27.743	46.6	1.39	34.8	21.82	258.65	2.54	1506.
3527	1.53	34.664	3472	27.763	45.7	1.26	32.6	24.27	340.26	3.00	1515.
4060	1.52	34.677	3992	27.774	46.0	1.19	31.2	26.71	434.35	3.27	1524.
4272	1.53	34.677	4198	27.773	46.8	1.18	31.1	27.69	476.01	3.28	1527.



RESULTS OF STD CASTS  
(P-70-9)

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 1

DATE 4/12/70

POSITION 48-33.0N, 125-33.0W GMT 23.9

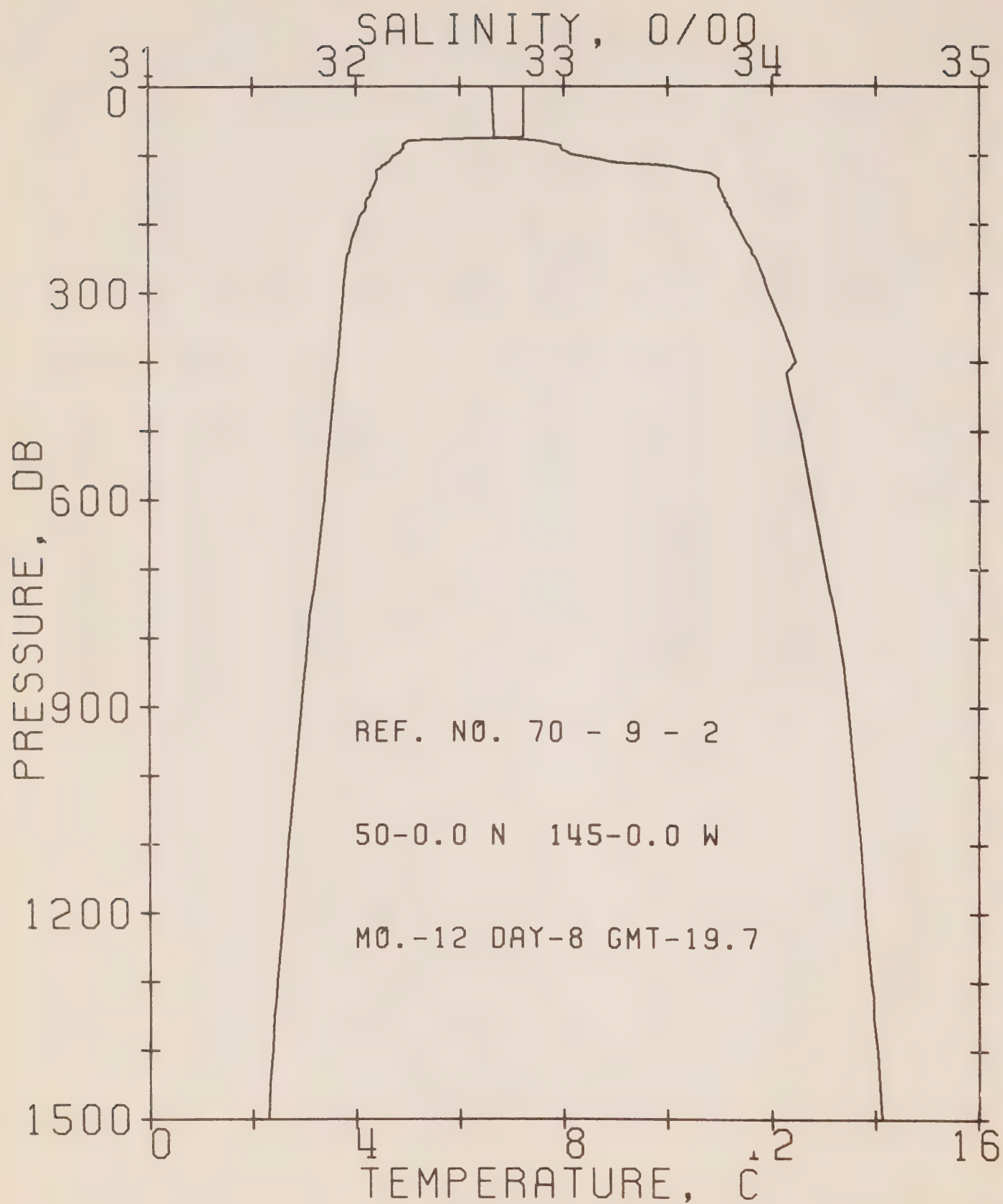
RESULTS OF STD CAST 24 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.25	32.17	0	24.89	307.1	0.0	0.0	1484.
10	9.24	32.17	10	24.89	307.3	0.31	0.02	1484.
20	9.23	32.17	20	24.89	307.4	0.61	0.06	1484.
30	9.23	32.17	30	24.89	307.6	0.92	0.14	1484.
50	9.12	32.27	50	24.99	298.8	1.54	0.39	1484.
75	8.25	32.81	75	25.54	246.5	2.19	0.81	1482.
100	7.74	33.17	99	25.90	213.2	2.76	1.31	1481.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	9.25	32.17	58.	8.47	32.67
10.	9.24	32.17	66.	8.27	32.81
20.	9.23	32.17	76.	8.25	32.81
40.	9.23	32.17	80.	8.20	32.83
42.	9.23	32.17	81.	8.20	32.84
44.	9.23	32.18	85.	7.96	32.99
46.	9.22	32.19	90.	7.90	33.05
48.	9.19	32.21	94.	7.82	33.11
50.	9.12	32.27	97.	7.80	33.16
51.	9.09	32.29	98.	7.75	33.16
54.	9.08	32.33	110.	7.72	33.20
56.	9.05	32.39	114.	7.71	33.22







PACIFIC OCEANOGRAPHIC GROUP

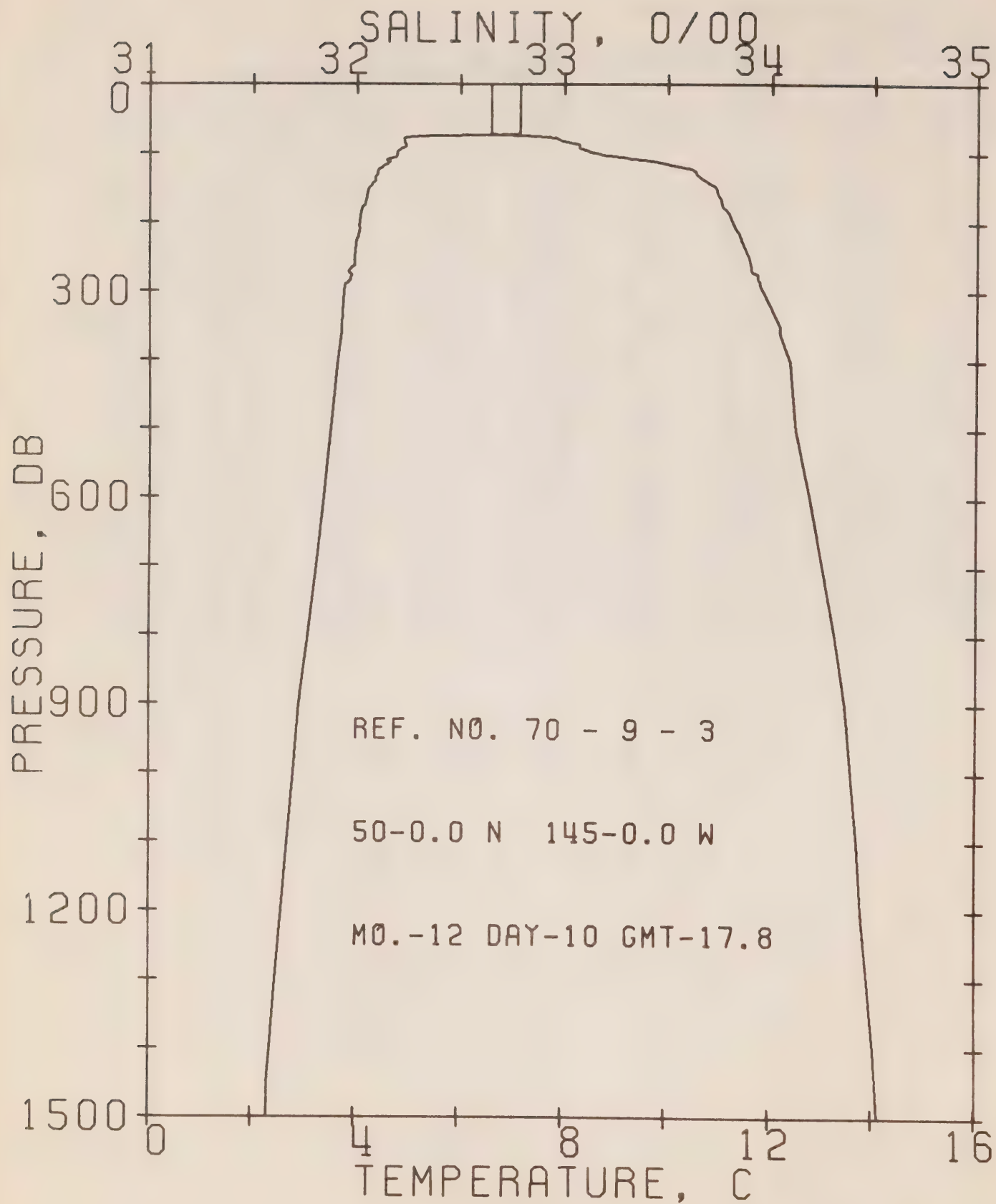
REFERENCE NO. 70- 9- 2

DATE 8/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 19.7

RESULTS OF STP CAST 71 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.25	32.64	0	25.55	244.2	0.0	0.0	1477.
10	7.25	32.66	10	25.57	242.9	0.24	0.01	1477.
20	7.25	32.66	20	25.57	242.9	0.49	0.05	1477.
30	7.25	32.66	30	25.57	243.0	0.73	0.11	1477.
50	7.25	32.67	50	25.57	243.1	1.22	0.31	1478.
75	6.32	32.72	75	25.74	227.6	1.82	0.70	1475.
100	4.74	33.07	99	26.20	183.7	2.31	1.13	1469.
125	4.42	33.69	124	26.72	134.3	2.71	1.58	1469.
150	4.34	33.76	149	26.79	128.2	3.03	2.04	1469.
175	4.22	33.80	174	26.83	124.4	3.35	2.56	1469.
200	4.05	33.84	199	26.88	119.7	3.65	3.14	1469.
225	3.94	33.88	223	26.93	115.8	3.95	3.78	1469.
250	3.84	33.93	248	26.98	111.1	4.23	4.47	1469.
300	3.78	33.99	298	27.03	106.4	4.77	5.99	1469.
400	3.67	34.12	397	27.14	96.4	5.79	9.58	1471.
500	3.52	34.14	496	27.18	94.1	6.76	14.03	1472.
600	3.40	34.20	595	27.23	89.1	7.67	19.16	1473.
800	3.08	34.33	793	27.37	77.7	9.34	31.01	1475.
1000	2.83	34.40	990	27.45	70.8	10.82	44.54	1477.
1200	2.60	34.45	1188	27.51	65.8	12.18	59.77	1480.
1500	2.28	34.53	1483	27.60	57.8	14.02	85.04	1484.





PACIFIC OCEANOGRAPHIC GROUP

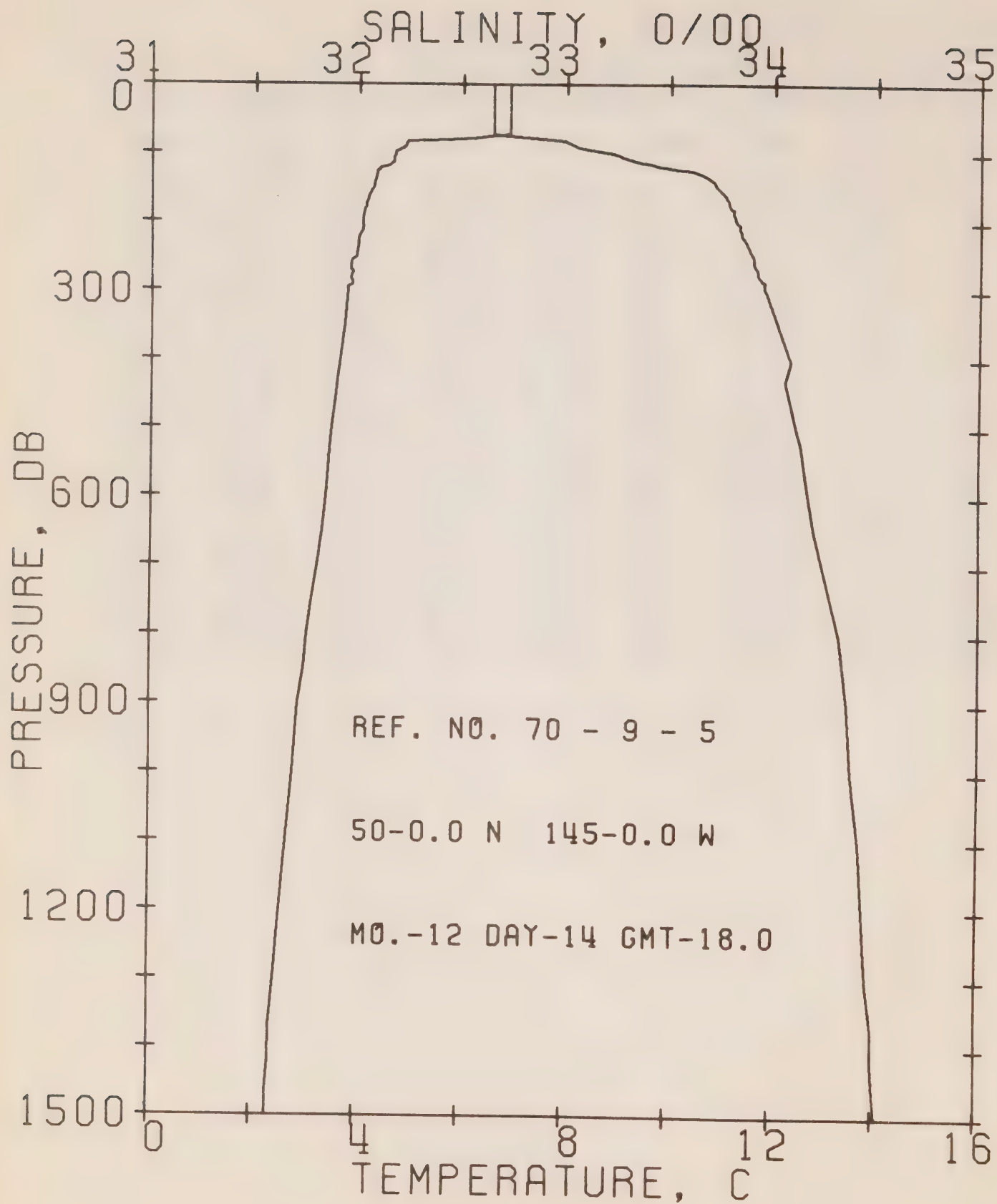
REFERENCE NO. 70- 9- 3

DATE 10/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 80 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.17	32.65	0	25.57	242.4	0.0	0.0	1477.
10	7.17	32.65	10	25.57	242.7	0.24	0.01	1477.
20	7.17	32.65	20	25.57	242.8	0.49	0.05	1477.
30	7.17	32.65	30	25.57	243.0	0.73	0.11	1477.
50	7.17	32.65	50	25.57	243.3	1.21	0.31	1477.
75	5.23	32.88	75	26.00	203.0	1.82	0.69	1470.
100	4.82	33.17	99	26.27	177.1	2.28	1.11	1469.
125	4.43	33.63	124	26.68	138.3	2.67	1.55	1469.
150	4.26	33.74	149	26.78	128.9	3.01	2.02	1469.
175	4.17	33.77	174	26.82	125.9	3.33	2.55	1469.
200	4.06	33.82	199	26.87	121.1	3.63	3.14	1469.
225	4.02	33.86	223	26.91	117.8	3.93	3.78	1469.
250	3.98	33.90	248	26.94	114.8	4.22	4.49	1469.
300	3.78	33.97	298	27.01	108.0	4.78	6.05	1469.
400	3.67	34.10	397	27.13	97.9	5.81	9.70	1471.
500	3.53	34.13	496	27.17	95.0	6.77	14.11	1472.
600	3.40	34.20	595	27.23	89.1	7.69	19.26	1473.
800	3.10	34.32	793	27.36	78.4	9.37	31.16	1475.
1000	2.81	34.40	990	27.45	70.6	10.85	44.68	1477.
1200	2.58	34.45	1188	27.51	65.5	12.20	59.89	1480.
1500	2.29	34.53	1483	27.60	58.0	14.04	85.12	1484.



PACIFIC OCEANOGRAPHIC GROUP

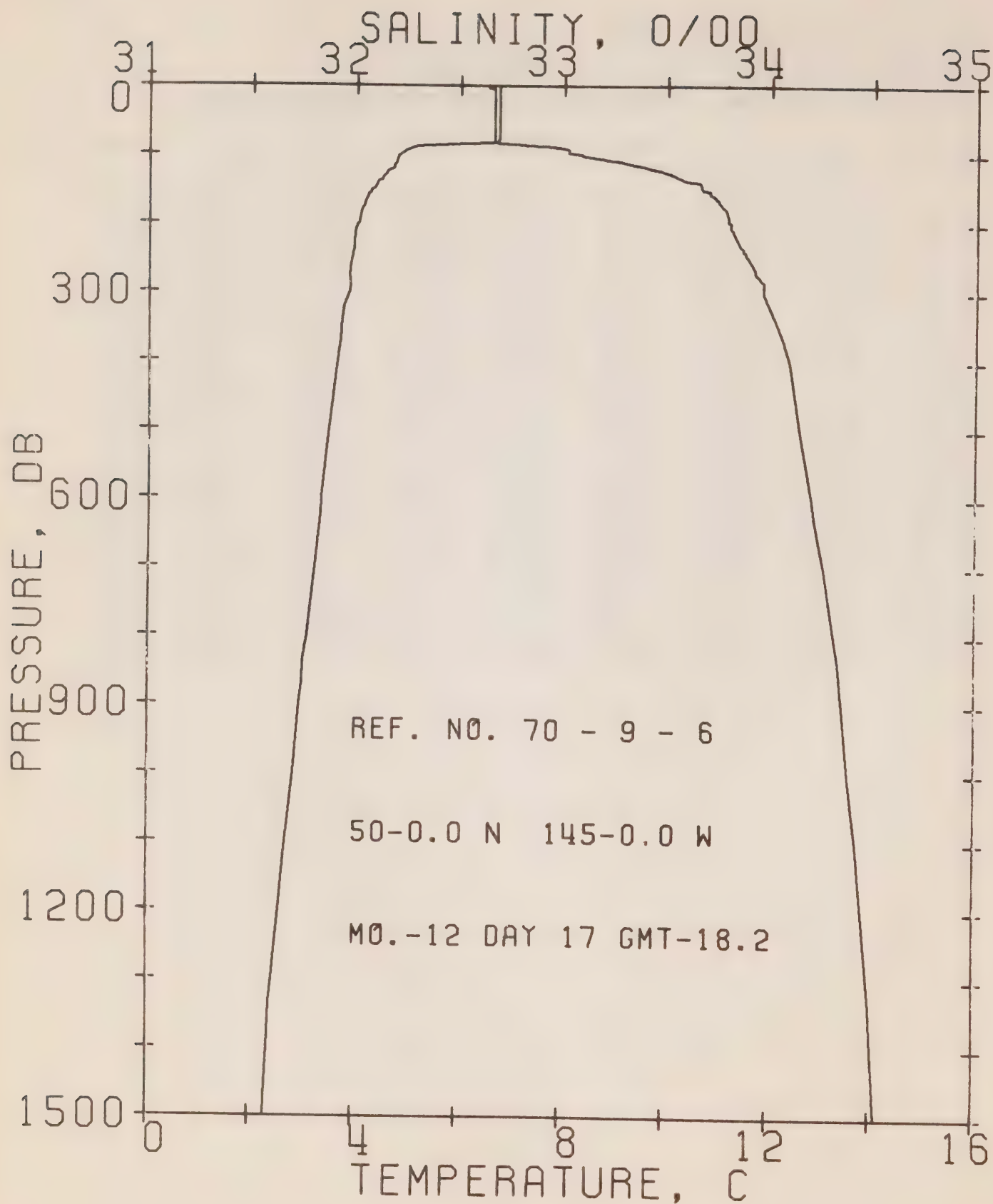
REFERENCE NO. 70- 9- 5

DATE 14/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 18.0

RESULTS OF STP CAST 75 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.93	32.65	0	25.60	239.3	0.0	0.0	1476.
10	6.93	32.65	10	25.60	239.6	0.24	0.01	1476.
20	6.93	32.65	20	25.60	239.8	0.48	0.05	1476.
30	6.93	32.65	30	25.60	239.9	0.72	0.11	1476.
50	6.93	32.65	50	25.60	240.1	1.20	0.31	1477.
75	6.56	32.73	75	25.72	229.8	1.80	0.69	1476.
100	4.73	33.23	99	26.33	171.6	2.28	1.11	1469.
125	4.38	33.61	124	26.67	139.6	2.68	1.57	1469.
150	4.30	33.74	149	26.78	129.6	3.01	2.03	1469.
175	4.16	33.79	174	26.84	124.0	3.33	2.56	1469.
200	4.09	33.83	199	26.87	120.8	3.63	3.14	1469.
225	4.02	33.87	223	26.91	117.5	3.93	3.79	1469.
250	3.99	33.91	248	26.95	114.2	4.22	4.49	1469.
300	3.81	33.97	298	27.01	108.3	4.78	6.05	1470.
400	3.68	34.09	397	27.12	98.7	5.81	9.73	1471.
500	3.52	34.12	496	27.16	95.6	6.80	14.25	1472.
600	3.41	34.18	595	27.22	90.7	7.73	19.44	1473.
800	3.05	34.33	793	27.37	77.1	9.41	31.43	1475.
1000	2.80	34.39	990	27.44	71.2	10.89	44.93	1477.
1200	2.56	34.45	1188	27.51	65.3	12.25	60.13	1480.
1500	2.29	34.52	1483	27.59	58.7	14.10	85.56	1484.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 6

DATE 17/12/70

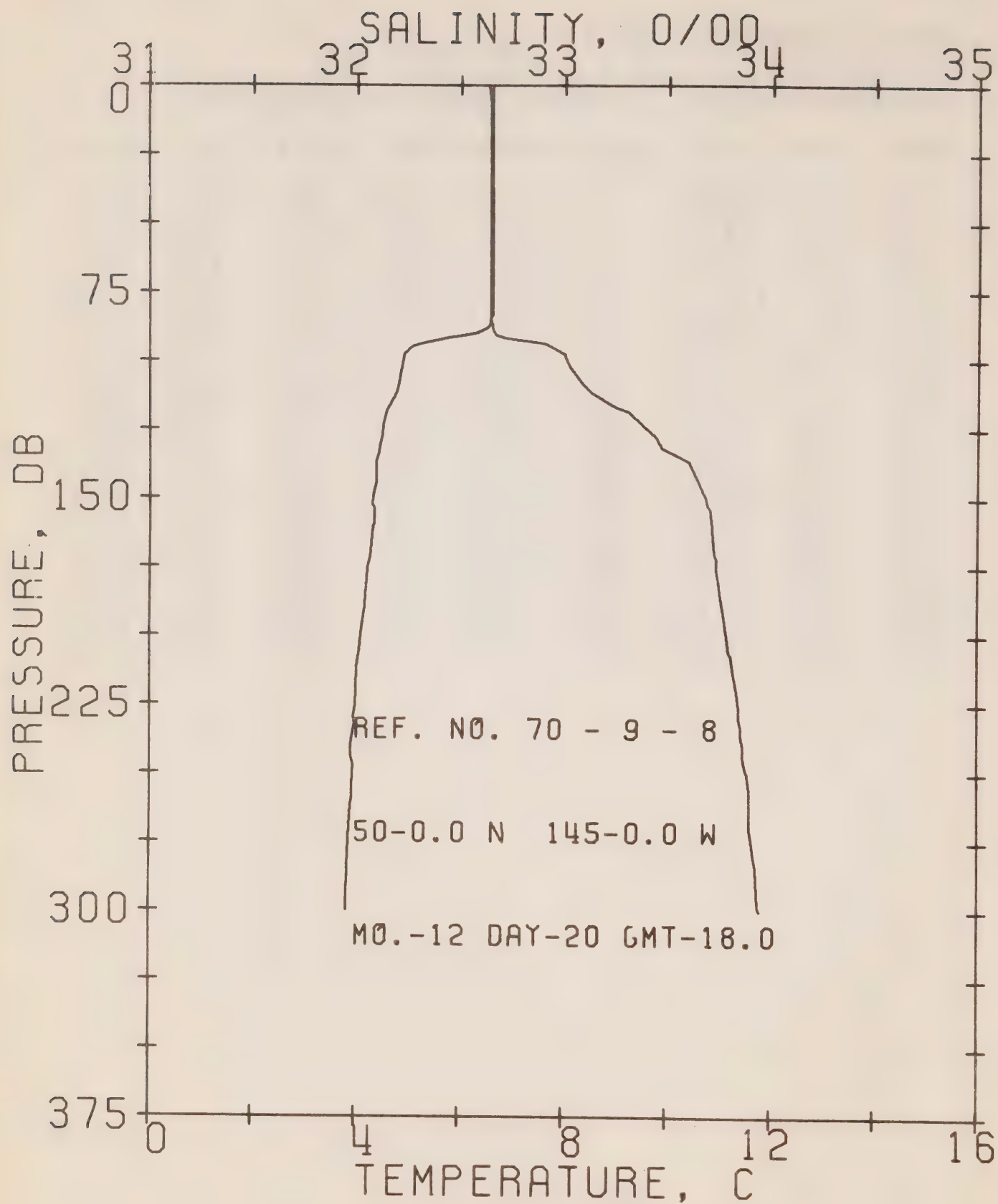
POSITION 50- 0.0N, 145- 0.0W

GMT 18.2

RESULTS OF STP CAST

92 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.78	32.64	0	25.62	238.1	0.0	0.0	1475.
10	6.77	32.67	10	25.64	236.1	0.24	0.01	1475.
20	6.77	32.67	20	25.64	236.2	0.47	0.05	1475.
30	6.77	32.67	30	25.64	236.3	0.71	0.11	1476.
50	6.77	32.67	50	25.64	236.6	1.18	0.30	1476.
75	6.77	32.67	75	25.64	236.9	1.77	0.68	1476.
100	4.86	33.09	99	26.20	183.5	2.30	1.14	1470.
125	4.62	33.49	124	26.55	151.2	2.72	1.62	1469.
150	4.34	33.68	149	26.72	134.4	3.07	2.12	1469.
175	4.16	33.77	174	26.82	125.5	3.39	2.65	1469.
200	4.06	33.81	199	26.86	122.0	3.70	3.24	1469.
225	3.98	33.85	223	26.90	118.5	4.00	3.89	1469.
250	3.94	33.90	248	26.94	114.5	4.30	4.60	1469.
300	3.89	33.97	298	27.00	109.0	4.85	6.15	1470.
400	3.67	34.10	397	27.13	97.9	5.88	9.80	1471.
500	3.51	34.15	496	27.18	93.3	6.83	14.18	1472.
600	3.36	34.21	595	27.25	88.0	7.74	19.24	1473.
800	3.09	34.32	793	27.36	78.2	9.40	31.06	1475.
1000	2.84	34.39	990	27.44	71.7	10.89	44.72	1477.
1200	2.57	34.46	1188	27.52	64.7	12.25	59.93	1480.
1500	2.28	34.53	1483	27.60	57.8	14.08	84.94	1484.



PACIFIC OCEANOGRAPHIC GROUP

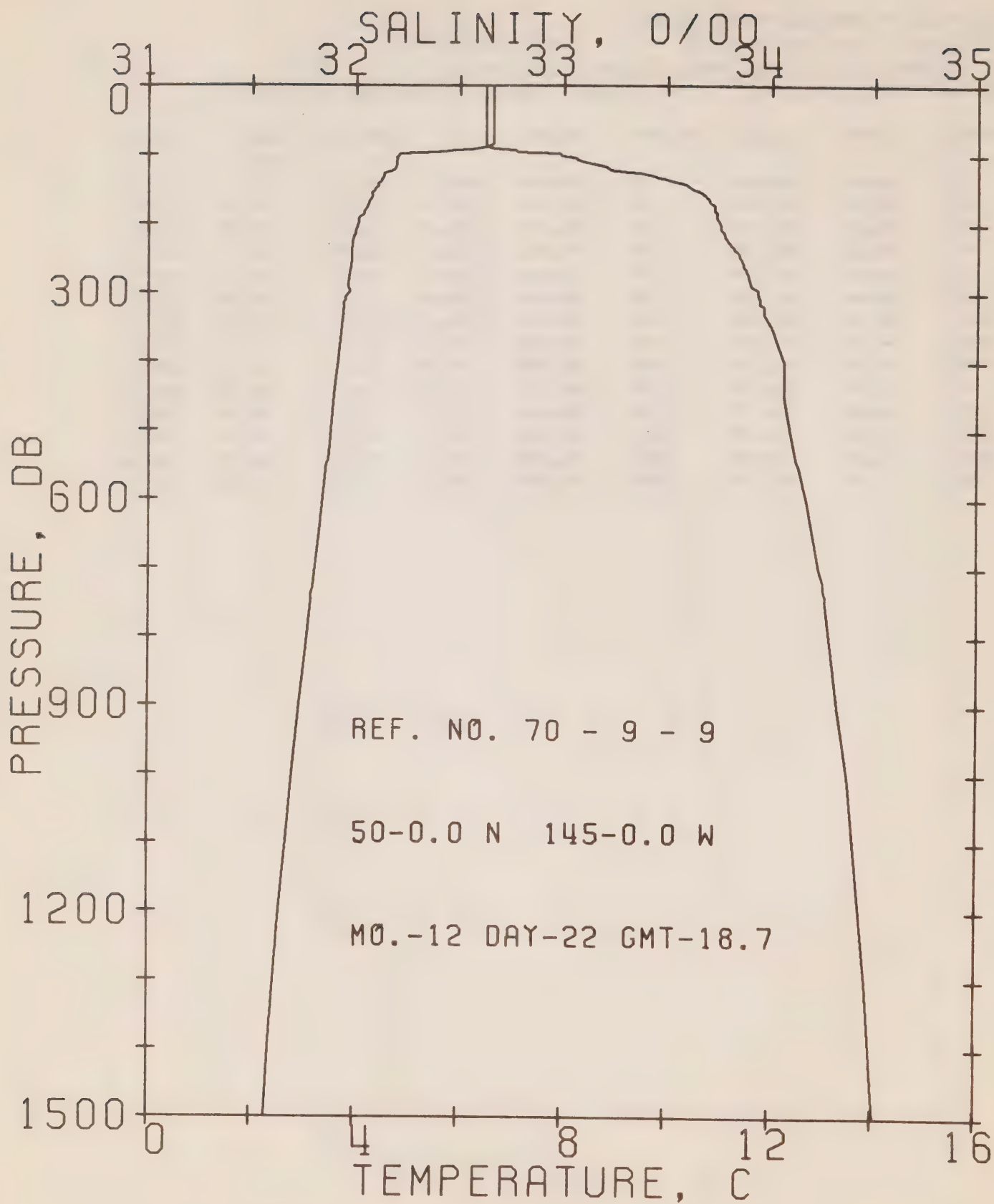
REFERENCE NO. 70- 9- 8

DATE 20/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 18.0

RESULTS OF STP CAST 61 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.62	32.64	0	25.64	236.2	0.0	0.0	1474.
10	6.62	32.65	10	25.64	235.8	0.24	0.01	1475.
20	6.63	32.65	20	25.64	235.9	0.47	0.05	1475.
30	6.63	32.65	30	25.64	236.1	0.71	0.11	1475.
50	6.64	32.65	50	25.64	236.5	1.18	0.30	1475.
75	6.64	32.65	75	25.64	236.8	1.77	0.68	1476.
100	4.92	33.02	99	26.14	189.4	2.33	1.17	1470.
125	4.53	33.40	124	26.49	156.6	2.77	1.67	1469.
150	4.34	33.69	149	26.73	133.4	3.13	2.17	1469.
175	4.24	33.74	174	26.78	128.9	3.45	2.72	1469.
200	4.09	33.79	199	26.84	123.8	3.77	3.32	1469.
225	3.99	33.85	223	26.90	118.7	4.07	3.97	1469.
250	3.94	33.89	248	26.93	115.2	4.36	4.68	1469.
300	3.81	33.95	298	27.00	109.8	4.93	6.26	1470.





PACIFIC OCEANOGRAPHIC GROUP

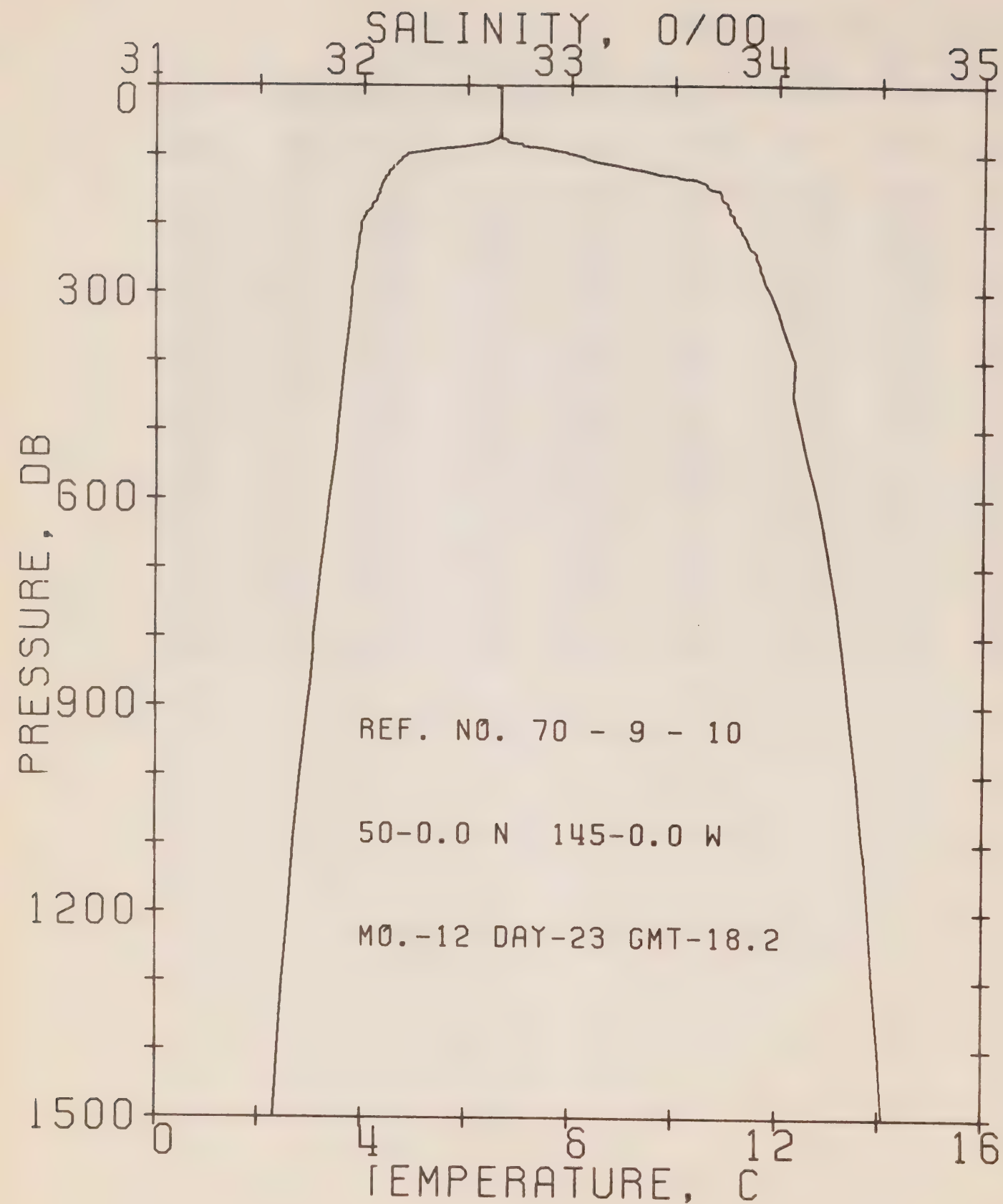
REFERENCE NO. 70- 9- 9

DATE 22/12/70

POSITION 50- 0.0N, 145- 0.0W : GMT 18.7

RESULTS OF STP CAST 90 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.66	32.63	0	25.62	237.4	0.0	0.0	1475.
10	6.66	32.63	10	25.62	237.7	0.24	0.01	1475.
20	6.66	32.63	20	25.62	237.9	0.48	0.05	1475.
30	6.66	32.63	30	25.62	238.0	0.71	0.11	1475.
50	6.67	32.63	50	25.62	238.3	1.19	0.30	1475.
75	6.67	32.63	75	25.62	238.6	1.79	0.68	1476.
100	4.85	32.99	99	26.13	190.6	2.36	1.19	1469.
125	4.64	33.32	124	26.41	164.1	2.80	1.70	1469.
150	4.39	33.63	149	26.68	138.5	3.17	2.22	1469.
175	4.24	33.73	174	26.78	129.6	3.51	2.77	1469.
200	4.06	33.76	199	26.82	125.7	3.82	3.38	1469.
225	3.96	33.80	223	26.86	122.1	4.13	4.05	1469.
250	3.93	33.86	248	26.91	117.3	4.43	4.77	1469.
300	3.90	33.94	298	26.98	111.4	5.01	6.38	1470.
400	3.68	34.07	397	27.10	100.2	6.06	10.12	1471.
500	3.55	34.10	496	27.14	97.4	7.05	14.68	1472.
600	3.39	34.18	595	27.22	90.5	7.99	19.94	1473.
800	3.09	34.29	793	27.34	80.5	9.70	32.06	1475.
1000	2.81	34.38	990	27.43	72.1	11.23	46.05	1477.
1200	2.56	34.44	1188	27.50	66.1	12.61	61.54	1480.
1500	2.27	34.51	1484	27.58	59.2	14.48	87.19	1483.



PACIFIC OCEANOGRAPHIC GROUP

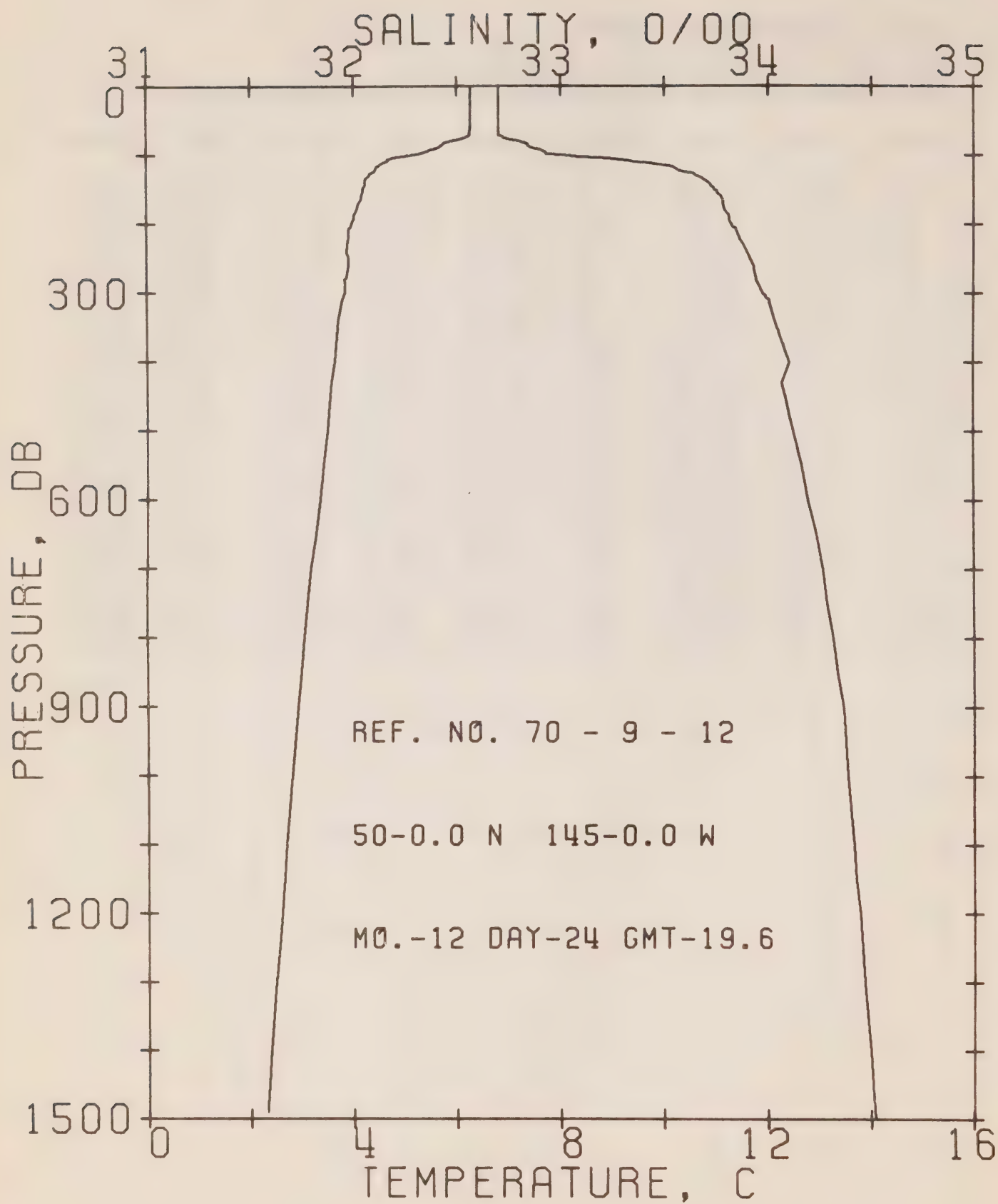
REFERENCE NO. 70- 9- 10

DATE 23/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 18.2

RESULTS OF STP CAST 91 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.67	32.65	0	25.64	236.0	0.0	0.0	1475.
10	6.66	32.67	10	25.66	234.7	0.24	0.01	1475.
20	6.66	32.67	20	25.66	234.8	0.47	0.05	1475.
30	6.66	32.67	30	25.66	235.0	0.70	0.11	1475.
50	6.66	32.67	50	25.66	235.2	1.18	0.30	1475.
75	6.64	32.67	75	25.66	235.4	1.76	0.67	1476.
100	4.87	33.02	99	26.15	188.9	2.30	1.15	1469.
125	4.52	33.38	124	26.47	158.6	2.74	1.65	1469.
150	4.35	33.68	149	26.73	134.3	3.10	2.15	1469.
175	4.18	33.76	174	26.81	126.5	3.42	2.69	1469.
200	3.98	33.80	199	26.86	121.6	3.73	3.28	1468.
225	3.94	33.86	223	26.91	117.5	4.03	3.92	1469.
250	3.90	33.90	248	26.95	113.8	4.32	4.62	1469.
300	3.80	33.97	298	27.01	108.2	4.87	6.18	1470.
400	3.67	34.09	397	27.12	98.6	5.91	9.86	1471.
500	3.54	34.12	496	27.16	95.8	6.89	14.35	1472.
600	3.38	34.20	595	27.24	88.9	7.81	19.53	1473.
800	3.07	34.31	793	27.35	78.8	9.48	31.41	1475.
1000	2.82	34.39	990	27.44	71.4	10.99	45.18	1477.
1200	2.58	34.45	1188	27.51	65.5	12.35	60.48	1480.
1500	2.30	34.52	1483	27.59	58.8	14.22	86.03	1484.





PACIFIC OCEANOGRAPHIC GROUP

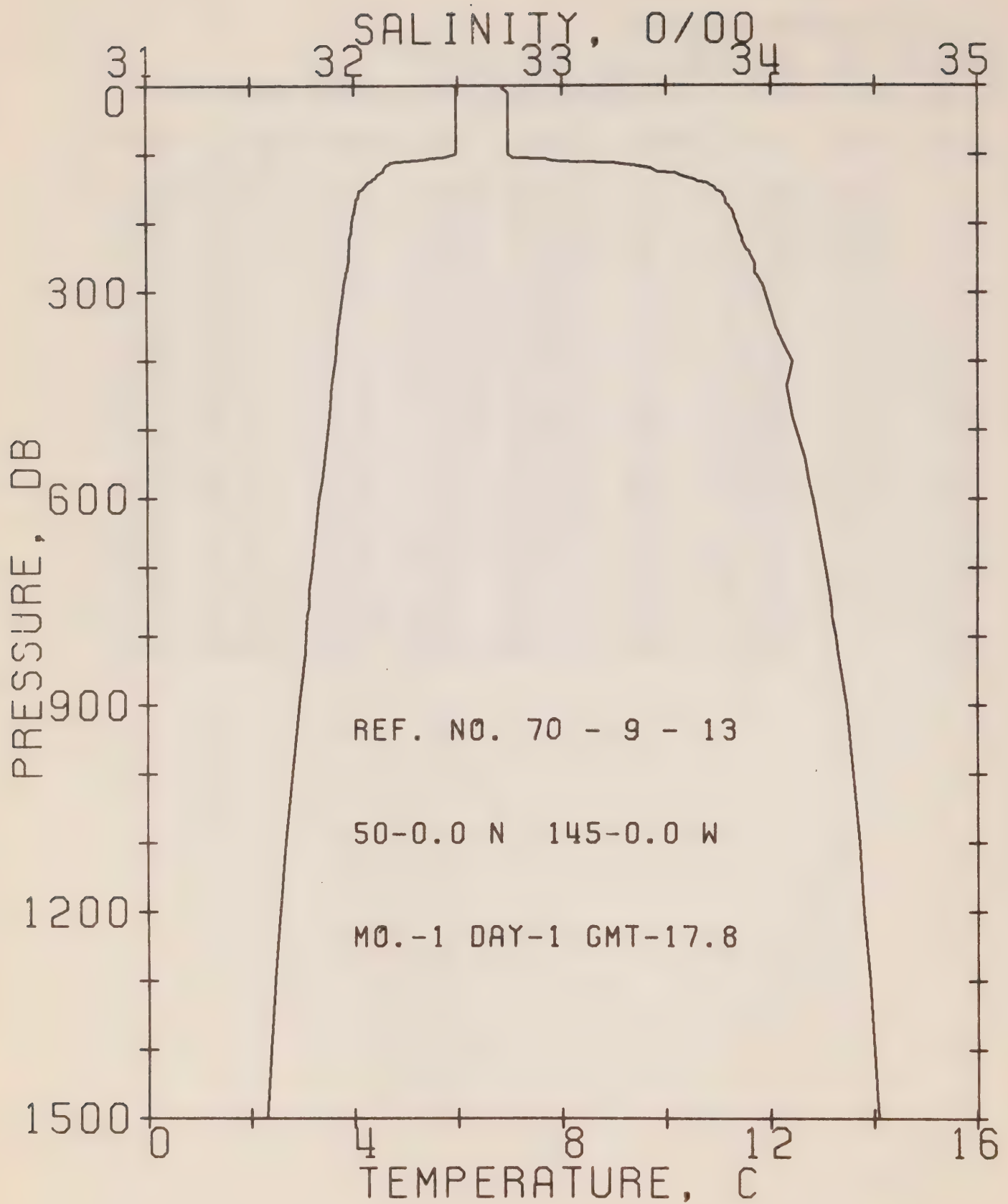
REFERENCE NO. 70- 9- 12

DATE 24/12/70

POSITION 50- 0.0N, 145- 0.0W GMT 19.6

RESULTS OF STP CAST 84 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.29	32.71	0	25.73	226.9	0.0	0.0	1473.
10	6.29	32.71	10	25.73	227.2	0.23	0.01	1473.
20	6.29	32.71	20	25.73	227.3	0.45	0.05	1474.
30	6.29	32.71	30	25.73	227.4	0.68	0.10	1474.
50	6.29	32.71	50	25.73	227.7	1.14	0.29	1474.
75	6.19	32.73	75	25.77	225.0	1.71	0.65	1474.
100	5.19	33.02	99	26.11	192.3	2.23	1.12	1471.
125	4.42	33.61	124	26.66	140.1	2.63	1.57	1469.
150	4.21	33.75	149	26.79	127.8	2.96	2.03	1469.
175	4.12	33.79	174	26.84	123.5	3.27	2.55	1469.
200	4.00	33.83	199	26.88	119.9	3.57	3.13	1469.
225	3.92	33.88	223	26.93	115.7	3.87	3.76	1469.
250	3.93	33.92	248	26.96	112.7	4.15	4.45	1469.
300	3.87	33.98	298	27.01	108.1	4.70	6.00	1470.
400	3.67	34.11	397	27.14	97.2	5.72	9.62	1471.
500	3.52	34.13	496	27.17	94.9	6.70	14.09	1472.
600	3.37	34.20	595	27.24	88.8	7.61	19.22	1473.
800	3.05	34.32	793	27.36	77.9	9.27	31.01	1475.
1000	2.82	34.39	990	27.44	71.4	10.75	44.60	1477.
1200	2.60	34.45	1188	27.51	65.8	12.13	59.96	1480.
1500	2.30	34.52	1483	27.59	58.8	13.99	85.53	1484.



PACIFIC OCEANOGRAPHIC GROUP

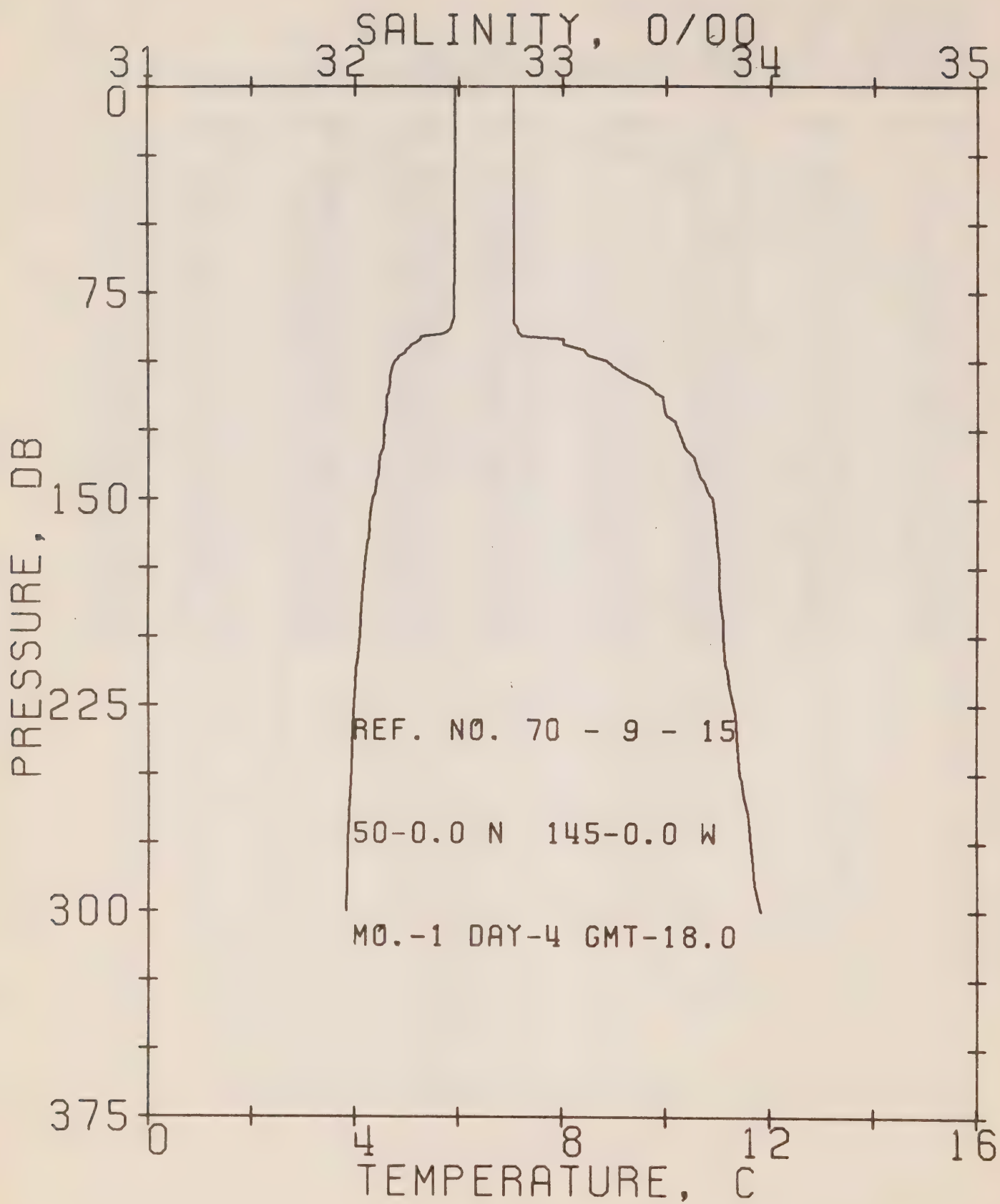
REFERENCE NO. 70- 9- 13

DATE 1/ 1/71

POSITION 50- 0.0N, 145- 0.0W GMT 17.8

RESULTS OF STP CAST 75 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.98	32.72	0	25.78	222.5	0.0	0.0	1472.
10	6.00	32.75	10	25.80	220.8	0.22	0.01	1472.
20	6.00	32.75	20	25.80	221.0	0.44	0.05	1472.
30	6.00	32.75	30	25.80	221.1	0.66	0.10	1473.
50	6.00	32.75	50	25.80	221.3	1.11	0.28	1473.
75	6.00	32.75	75	25.80	221.6	1.66	0.63	1473.
100	6.00	32.75	99	25.80	221.9	2.21	1.13	1474.
125	4.60	33.46	124	26.52	153.2	2.67	1.65	1469.
150	4.22	33.74	149	26.79	128.4	3.01	2.13	1469.
175	4.05	33.80	174	26.86	122.1	3.32	2.64	1468.
200	3.99	33.84	199	26.89	118.7	3.62	3.21	1469.
225	3.94	33.87	223	26.92	116.5	3.92	3.85	1469.
250	3.92	33.92	248	26.96	112.9	4.20	4.54	1469.
300	3.82	33.98	298	27.02	107.6	4.76	6.09	1470.
400	3.67	34.11	397	27.14	97.2	5.78	9.75	1471.
500	3.52	34.13	496	27.17	94.8	6.76	14.21	1472.
600	3.34	34.21	595	27.25	87.8	7.67	19.31	1473.
800	3.06	34.32	793	27.36	78.0	9.32	31.07	1475.
1000	2.80	34.40	990	27.45	70.5	10.80	44.60	1477.
1200	2.56	34.45	1188	27.51	65.3	12.16	59.75	1480.
1500	2.28	34.52	1483	27.59	58.5	14.00	85.11	1484.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 15

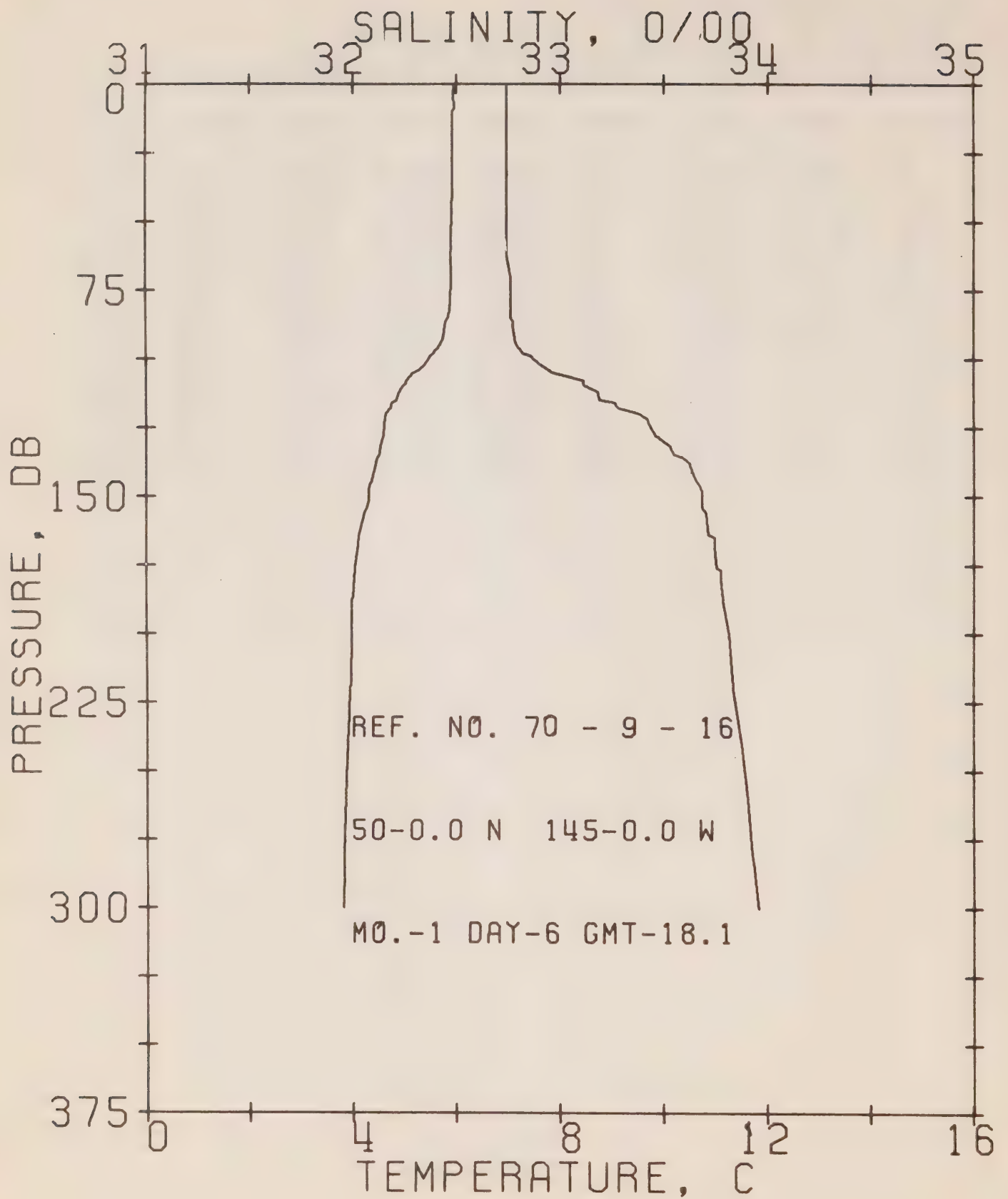
DATE 4/ 1/71

POSITION 50- 0.0N, 145- 0.0W GMT 18.0

RESULTS OF STP CAST 56 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.95	32.77	0	25.82	218.4	0.0	0.0	1472.
10	5.95	32.77	10	25.82	218.7	0.22	0.01	1472.
20	5.95	32.77	20	25.82	218.8	0.44	0.04	1472.
30	5.94	32.77	30	25.82	218.9	0.66	0.10	1472.
50	5.94	32.77	50	25.82	219.1	1.09	0.28	1473.
75	5.93	32.77	75	25.83	219.2	1.64	0.63	1473.
100	4.80	33.22	99	26.31	173.1	2.16	1.09	1469.
125	4.58	33.56	124	26.61	145.1	2.55	1.53	1469.
150	4.36	33.73	149	26.76	130.6	2.89	2.02	1469.
175	4.20	33.76	174	26.80	127.0	3.22	2.55	1469.
200	4.11	33.78	199	26.83	124.7	3.53	3.15	1469.
225	3.98	33.83	223	26.88	119.8	3.84	3.81	1469.
250	3.94	33.86	248	26.91	117.4	4.13	4.53	1469.
300	3.83	33.96	298	27.00	109.2	4.70	6.11	1470.





PACIFIC OCEANOGRAPHIC GROUP

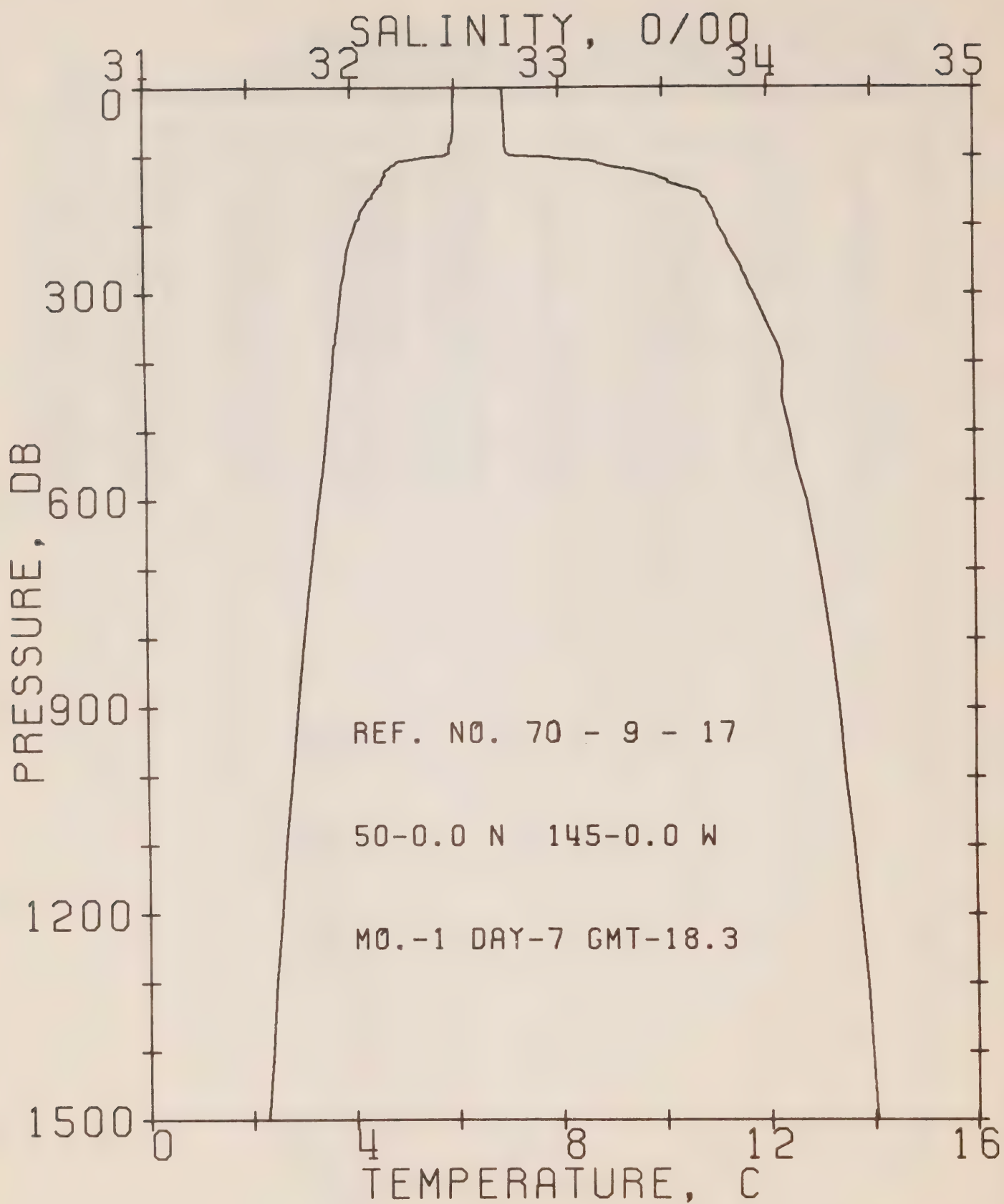
REFERENCE NO. 70- 9- 16

DATE 6/ 1/71

POSITION 50- 0.0N, 145- 0.0W GMT 18.1

RESULTS OF STP CAST 67 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.97	32.75	0	25.81	220.1	0.0	0.0	1472.
10	5.95	32.75	10	25.81	220.2	0.22	0.01	1472.
20	5.95	32.75	20	25.81	220.3	0.44	0.04	1472.
30	5.95	32.75	30	25.81	220.4	0.66	0.10	1472.
50	5.93	32.75	50	25.81	220.5	1.10	0.28	1473.
75	5.91	32.77	75	25.83	219.0	1.65	0.63	1473.
100	5.49	32.88	99	25.97	206.2	2.19	1.11	1472.
125	4.62	33.45	124	26.51	154.3	2.64	1.62	1469.
150	4.32	33.69	149	26.74	133.2	2.99	2.12	1469.
175	4.05	33.76	174	26.82	125.5	3.32	2.65	1468.
200	3.97	33.82	199	26.88	120.3	3.62	3.24	1468.
225	3.93	33.85	223	26.90	117.9	3.92	3.88	1469.
250	3.87	33.89	248	26.95	114.1	4.21	4.58	1469.
300	3.80	33.96	298	27.00	108.9	4.77	6.14	1470.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 70- 9- 17

DATE 7/ 1/71

POSITION 50- 0.0N, 145- 0.0W GMT 18.3

RESULTS OF STP CAST 76 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.02	32.72	0	25.78	223.0	0.0	0.0	1472.
10	6.02	32.74	10	25.79	221.7	0.22	0.01	1472.
20	6.02	32.74	20	25.79	221.6	0.44	0.05	1472.
30	6.02	32.74	30	25.80	221.6	0.67	0.10	1473.
50	6.01	32.75	50	25.80	221.6	1.11	0.28	1473.
75	5.99	32.75	75	25.80	221.5	1.66	0.64	1473.
100	5.58	32.90	99	25.97	205.7	2.21	1.13	1472.
125	4.68	33.43	124	26.49	156.5	2.65	1.62	1470.
150	4.49	33.66	149	26.69	137.3	3.02	2.14	1470.
175	4.26	33.74	174	26.78	129.1	3.35	2.69	1469.
200	4.11	33.77	199	26.82	125.5	3.67	3.29	1469.
225	3.99	33.81	223	26.87	121.2	3.97	3.96	1469.
250	3.92	33.86	248	26.91	117.2	4.27	4.68	1469.
300	3.81	33.94	298	26.99	110.5	4.84	6.28	1470.
400	3.66	34.08	397	27.11	99.3	5.89	10.00	1471.
500	3.52	34.11	496	27.15	96.3	6.88	14.52	1472.
600	3.36	34.19	595	27.23	89.4	7.81	19.74	1473.
800	3.05	34.30	793	27.35	79.3	9.49	31.71	1475.
1000	2.80	34.37	990	27.43	72.7	11.01	45.58	1477.
1200	2.57	34.44	1188	27.50	66.2	12.39	61.07	1480.
1500	2.27	34.51	1483	27.58	59.2	14.26	86.76	1483.





SURFACE TEMPERATURE AND SALINITY OBSERVATIONS  
(P-70-8)

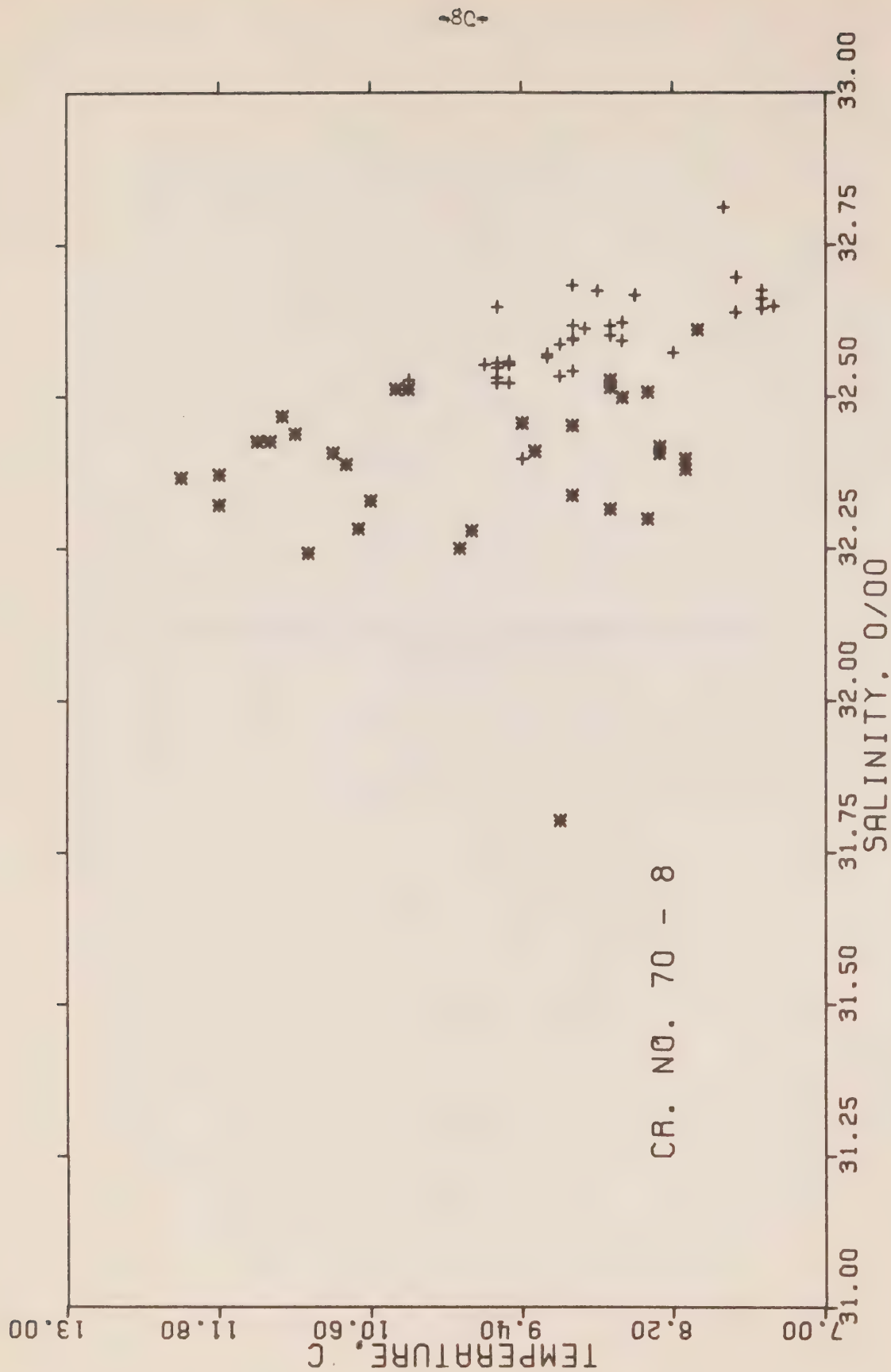


Fig. 12 T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) obtained from bucket samples during Cruise P-70-8.

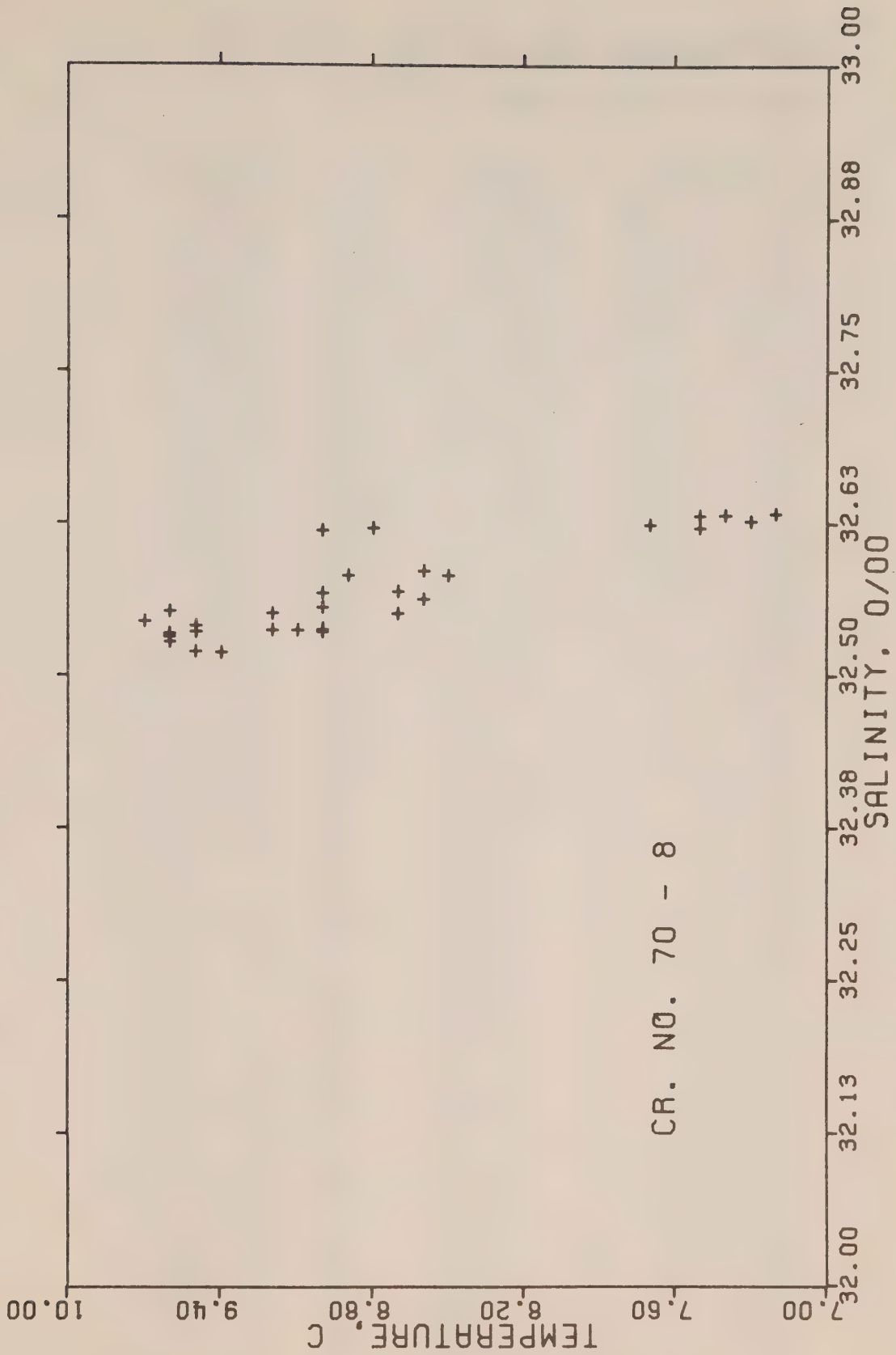


Fig. 13 T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) obtained from ship's seawater loop during Cruise P-70-8.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 70- 8

Bucket Sample Observations

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	P/CO	C	WEST
70	10	31	330	32.279	9.8	126- 0
70	10	31	540	32.282	10.7	126-40
70	10	31	945	32.366	12.1	127-40
70	10	31	1310	32.321	11.8	128-40
70	10	31	2015	32.426	11.4	130-40
70	11	1	118	32.467	11.3	131-40
70	11	1	501	32.439	11.2	132-40
70	11	1	1005	32.243	11.1	133-40
70	11	1	1330	32.408	10.9	134-40
70	11	1	1700	32.426	11.5	135-40
70	11	1	2006	32.371	11.8	136-40
70	11	2	300	32.329	10.6	137-40
70	11	2	615	32.389	10.8	138-40
70	11	2	1125	32.512	10.3	139-40
70	11	2	1424	32.513	10.4	140-40
70	11	2	1917	32.528	10.3	141-40
70	11	4	0	32.522	9.6	145- 0
70	11	5	0	32.531	9.6	ON STATION
70	11	6	0	32.552	9.7	ON STATION
70	11	7	0	32.555	9.6	ON STATION
70	11	8	0	32.522	9.5	ON STATION
70	11	9	0	32.548	9.6	ON STATION
70	11	10	0	32.552	9.5	ON STATION
70	11	11	0	32.558	9.5	ON STATION
70	11	12	0	32.648	9.6	ON STATION
70	11	13	0	32.397	9.4	ON STATION
70	11	14	0	32.534	9.1	ON STATION
70	11	15	0	32.565	9.2	ON STATION
70	11	16	0	32.570	9.2	ON STATION
70	11	17	0	32.586	9.1	ON STATION
70	11	18	0	32.594	9.0	ON STATION
70	11	19	0	32.543	9.0	ON STATION
70	11	20	0	32.618	9.0	ON STATION
70	11	21	0	32.601	8.7	ON STATION
70	11	22	0	32.596	9.0	ON STATION
70	11	23	0	32.684	9.0	ON STATION
70	11	24	0	32.675	8.8	ON STATION
70	11	25	0	32.617	8.7	ON STATION
70	11	26	0	32.593	8.6	ON STATION
70	11	27	0	32.612	8.9	ON STATION
70	11	28	0	32.667	8.5	ON STATION
70	11	29	0	32.623	8.6	ON STATION
70	12	1	0	32.811	7.8	ON STATION
70	12	2	0	32.639	7.7	ON STATION
70	12	3	0	32.649	7.4	ON STATION
70	12	4	0	32.675	7.5	ON STATION
70	12	5	0	32.661	7.5	ON STATION
70	12	7	600	32.645	7.5	143-40
70	12	7	1005	32.696	7.7	142-40

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 70- 8

Bucket Sample Observations

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
70	12	7	1005	32.696	7.7	142-40
70	12	7	1606	32.573	8.2	141-40
70	12	7	1830	32.610	8.0	140-40
70	12	7	2115	32.418	8.3	139-40
70	12	8	230	32.406	8.3	138-40
70	12	8	212	32.528	8.7	137-40
70	12	8	430	32.515	8.7	136-40
70	12	8	700	32.508	8.4	135-40
70	12	8	920	32.299	8.4	134-40
70	12	8	1130	32.315	8.7	133-40
70	12	8	1406	32.380	8.1	132-40
70	12	8	1630	32.499	8.6	131-40
70	12	8	1900	32.398	8.1	130-40
70	12	8	2130	32.452	9.0	129-40
70	12	9	0	32.456	9.4	128-40
70	12	9	236	32.410	9.3	127-40
70	12	9	510	32.338	9.0	126-40
70	12	9	730	31.803	9.1	126- 0
70	12	9	830	32.250	9.9	125-33



SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 70- 8

Seawater Loop Observations

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
70	11	4	0	32.534	9.6	145- 0
70	11	5	0	32.531	9.6	ON STATION
70	11	6	0	32.544	9.7	ON STATION
70	11	7	0	32.552	9.6	ON STATION
70	11	8	0	32.519	9.5	ON STATION
70	11	9	0	32.527	9.6	ON STATION
70	11	10	0	32.540	9.5	ON STATION
70	11	11	0	32.535	9.5	ON STATION
70	11	13	0	32.518	9.4	ON STATION
70	11	15	0	32.550	9.2	ON STATION
70	11	16	0	32.536	9.2	ON STATION
70	11	17	0	32.536	9.1	ON STATION
70	11	18	0	32.537	9.0	ON STATION
70	11	19	0	32.535	9.0	ON STATION
70	11	20	0	32.555	9.0	ON STATION
70	11	21	0	32.550	8.7	ON STATION
70	11	22	0	32.567	9.0	ON STATION
70	11	23	0	32.618	9.0	ON STATION
70	11	24	0	32.620	8.8	ON STATION
70	11	25	0	32.568	8.7	ON STATION
70	11	26	0	32.562	8.6	ON STATION
70	11	27	0	32.581	8.9	ON STATION
70	11	28	0	32.581	8.5	ON STATION
70	11	29	0	32.585	8.6	ON STATION
70	12	2	0	32.624	7.7	ON STATION
70	12	3	0	32.632	7.4	ON STATION
70	12	4	0	32.631	7.5	ON STATION
70	12	5	0	32.621	7.5	ON STATION
70	12	6	0	32.627	7.3	ON STATION
70	12	7	0	32.633	7.2	ON STATION

SURFACE TEMPERATURES AND SALINITIES  
(P-70-9)

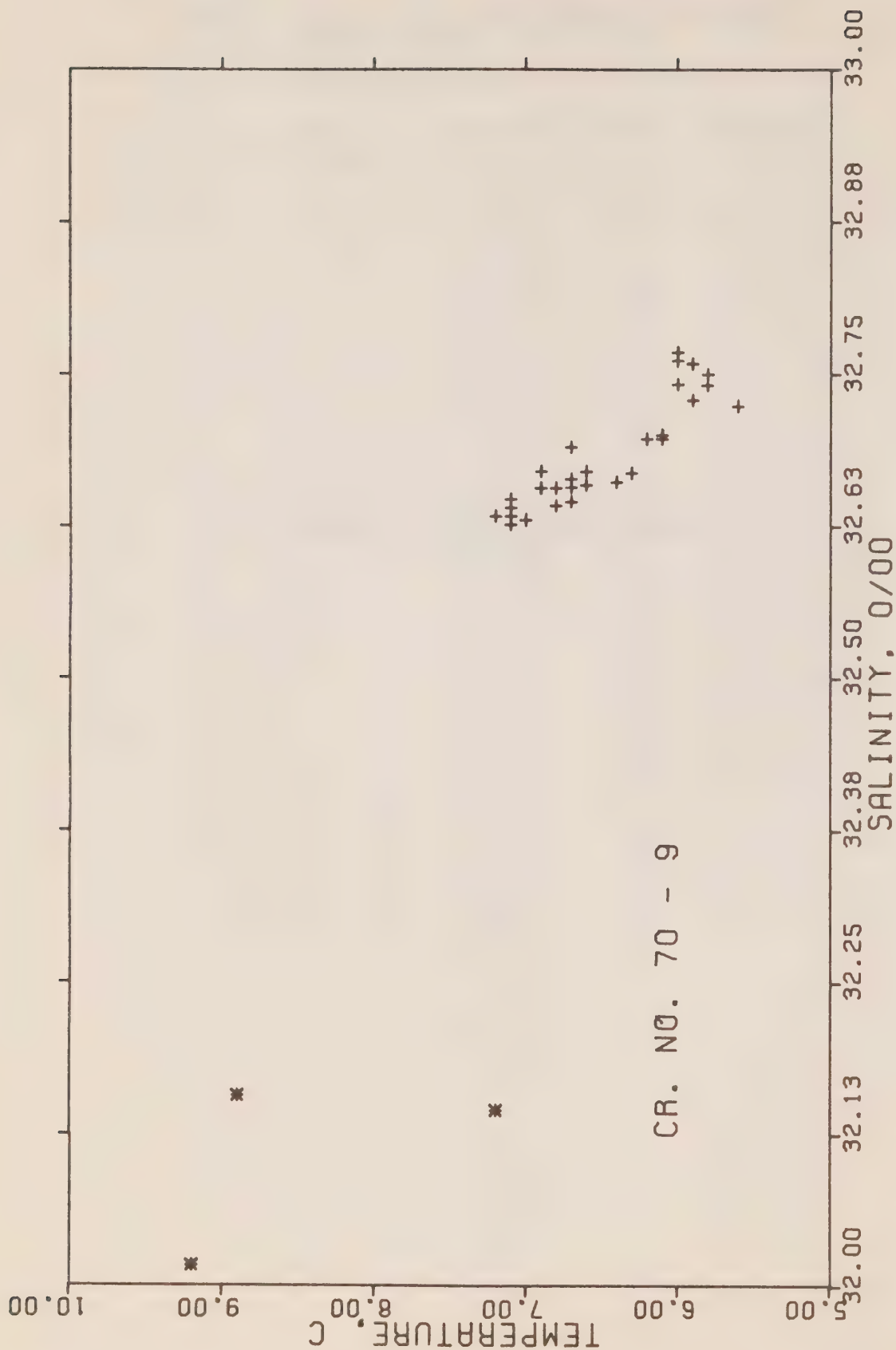


Fig. 14 T-S plot of surface temperature and salinity observations on Line P (Asterisks) and at Station P (Pluses) during Cruise P-70-9.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 70- 9

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
70	12	4	2354	32.017	9.2	125-32
70	12	5	136	32.157	8.9	126- 0
70	12	5	318	32.145	7.2	126-40
70	12	9	0	32.633	7.2	ON STATION
70	12	10	0	32.630	7.0	ON STATION
70	12	11	0	32.647	7.1	ON STATION
70	12	12	0	32.640	7.1	ON STATION
70	12	13	0	32.633	7.1	ON STATION
70	12	14	0	32.626	7.1	ON STATION
70	12	15	0	32.656	6.9	ON STATION
70	12	16	0	32.642	6.8	ON STATION
70	12	17	0	32.656	6.8	ON STATION
70	12	18	0	32.657	6.7	ON STATION
70	12	19	0	32.645	6.7	ON STATION
70	12	20	0	32.670	6.9	ON STATION
70	12	21	0	32.659	6.6	ON STATION
70	12	22	0	32.656	6.9	ON STATION
70	12	23	0	32.664	6.7	ON STATION
70	12	24	0	32.690	6.7	ON STATION
70	12	25	0	32.670	6.6	ON STATION
70	12	26	0	32.661	6.4	ON STATION
70	12	27	0	32.669	6.3	ON STATION
70	12	28	0	32.697	6.2	ON STATION
70	12	29	0	32.697	6.1	ON STATION
70	12	30	0	32.700	6.1	ON STATION
70	12	31	0	32.724	5.6	ON STATION
71	1	1	0	32.750	5.8	ON STATION
71	1	2	0	32.729	5.9	ON STATION
71	1	3	0	32.761	6.0	ON STATION
71	1	4	0	32.741	5.8	ON STATION
71	1	5	0	32.759	5.9	ON STATION
71	1	6	0	32.759	5.9	ON STATION
71	1	8	0	32.742	6.0	ON STATION
71	1	9	0	32.768	6.0	ON STATION







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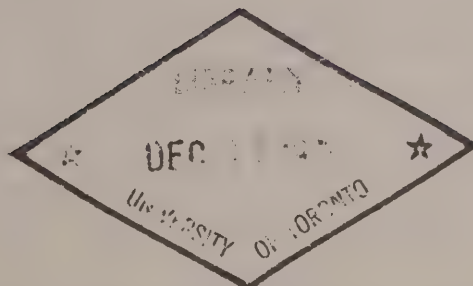
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**OCEANOGRAPHIC OBSERVATIONS AT  
OCEAN STATION P (50° N, 145° W)**

**VOLUME 50**

**January 8 - May 20, 1971**

**B. Minkley, C. de Jong, W. Hansen**



*Canada*  
**Department of the Environment  
Marine Sciences Branch  
Pacific Region  
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Victoria, B.C.**



MARINE SCIENCES BRANCH, PACIFIC REGION

PACIFIC MARINE SCIENCE REPORT NO. 71-9

OCEANOGRAPHIC OBSERVATIONS AT OCEAN STATION P (50°N, 145°W)

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JANUARY 8 - MAY 20, 1971

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MARINE SCIENCES BRANCH  
DEPARTMENT OF THE ENVIRONMENT





## INTRODUCTION

Canadian operation of Ocean Weather Station P (latitude  $50^{\circ}00'N$ , longitude  $145^{\circ}00'W$ ) was inaugurated in December, 1950. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the CCGS VANCOUVER and the CCGS QUADRA. Each ship remains on station for a period of six weeks, and is then relieved by the alternative ship, thus maintaining a continuous watch. The chief purpose of the station is to operate as a meteorological station for surface and upper-air observations and as an air-sea rescue station.

Bathythermograph observations have been made at Station P since July, 1952. A program of more extensive oceanographic observations was commenced in August, 1956. This was further extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections in addition to being made on Line P oceanographic stations are also made at odd meridians at  $40'$ , i.e.  $139^{\circ} 40'W$ ,  $141^{\circ} 40'W$ , etc. Data observed prior to 1968 has been indexed by Collins et al (1969).

The present record includes hydrographic and salinity-temperature-pressure data collected from the VANCOUVER during the period January 8 to February 24, 1971, the QUADRA during the period February 19 to April 8, 1971, and the VANCOUVER during the period April 2 to May 20, 1971. Mechanical and expendable bathythermograph traces obtained on these cruises are available on IBM microfiche cards and will be available in digitized format on magnetic tape in the near future.

All physical data has been archived by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), The Biological Station, Nanaimo, B.C., Canada. Requests for these data should be directed to FRB.

Marine Geochemical data are for the Ocean Chemistry Group, Marine Sciences Branch, Department of the Environment, the Biological Station, Nanaimo, B.C., Canada.

Bird observations are sent to Dr. M. Myres, University of Calgary, Calgary, Alberta, Canada; and Marine Mammal observations to Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C., Canada.

Program of Observations from CCGS VANCOUVER, January 8 to February 24, 1971, (P-71-1) (CODC Ref. No. 02-71-001)

Oceanographic observations were made by Messrs. B. Minkley and W. Hansen of the Marine Sciences Branch, Department of the Environment.

En route to Station "P" Line P oceanographic stations 1 to 5 were occupied. A Bissett-Berman Model 9040 STD was used at these stations to obtain continuous temperature and salinity records to near bottom or to (approximately) 1500 meters. At Station 4 sample depths were extended to 2400 meters with a Nansen bottle cast. Mechanical and XBT casts were also made at these stations and at Line P BT stations as far as 131° 40'W. Surface salinity and nitrate bucket samples were obtained at all stations.

On Station "P" profiles of salinity, temperature and oxygen were obtained as follows:

- i) Weekly Nansen bottle casts to near bottom (4200 m).
- ii) STD casts to 1500 meters with each Nansen bottle cast.
- iii) STD casts to 300 meters were made twice weekly.
- iv) Mechanical BT casts to 275 meters were made 8 times daily and a bucket salinity surface sample was taken daily at 0000 hours GMT.

Other observations made and data obtained at Station "P" were as follows:

#### I. Biological and Productivity

Only 2 vertical plankton hauls from 150 meters and 2 ten minute horizontal tows were made during this patrol.

3 Van Dorn bottle casts to 200 meters were made for nitrates, plant pigments and photosynthesis. A secchi disc depth measurement was made once a week.

## II. Marine Geochemistry

- a) Oxygen samples were taken once a week from the hydrographic casts.
- b) Daily surface nutrient samples were taken.
- c) Two surface  $C^{14} O_2$  samples were obtained from the seawater loop during the cruise.
- d) Alkalinity samples were obtained on alternative days.
- e) Duplicate air samples for  $CO_2$  analysis were obtained once a week.

## III. Marine Mammal, Bird and Observations for other Institutes

- a) Marine mammal and bird observations were recorded.

En route from Station P only surface salinity and nitrate samples were taken on Line P.

Program of Observations from CCGS QUADRA, February 19 to April 8, 1971 (P-71-2) (CODC Ref. No. 02-71-002)

Oceanographic observations were made by Mr. C. de Jong of the Marine Sciences Branch, Department of the Environment.

En route to Station P Line P oceanographic stations 1 to 5 were occupied. A Bissett-Berman Model 9006 STD was used at these stations to obtain continuous temperature and salinity records to near bottom or 1500 meters (approximately). Mechanical BT casts to 275 meters were also made and surface salinity and nitrate samples taken at these stations.

On Station P profiles of salinity, temperature and oxygen were obtained as follows:

- i) Weekly Nansen bottle casts to near bottom (4200 meters).
- ii) STD casts to 1500 meters with each Nansen bottle cast.
- iii) STD casts to 300 meters were made twice weekly.
- iv) Mechanical BT casts to 275 meters were made 8 times daily and a surface salinity sample taken each day at 0000 hours GMT.

Other observations made and data obtained at Station P were as follows:

I. Biological and Productivity

Twenty-four 50 meter, twenty-four 150 meter and two 1200 meter vertical plankton hauls were made on this patrol. Daily samples for micro-organisms were collected from the sea-water loop.

3 Van Dorn bottle casts to 75 meters were made for nitrate, plant pigment and photosynthesis samples. Surface nitrate samples were also taken on Line P stations outbound and inbound. A secchidisc depth measurement was made once a week.

II. Marine Geochemistry

- a) Oxygen samples were taken once a week from the Nansen bottle casts.
- b) Daily surface nutrient samples were taken and hourly samples for one 24 hour period from the seawater loop.
- c) Surface alkalinity samples were taken from the seawater loop once every three days.
- d) One cast at depths to 20 meters was made for nutrient, alkalinity and salinity samples.
- e) Two surface  $C^{14}$   $O_2$  samples were collected from the seawater loop.
- f) Duplicate air samples for  $CO_2$  analysis were collected once each week.

III. Marine Mammal, Bird and Observations for other Institutes

- a) Marine mammal and bird observations were recorded.

En route from Station P Line P oceanographic stations 12 to 1 were occupied. STD casts to 1500 meters or near bottom were made. Mechanical BT casts were made and surface salinity samples taken at all Line P oceanographic and BT stations.



Program of Observations from CCGS VANCOUVER, April 2 to May 20, 1971 (P-71-3) (CODC Ref. No. 02-71-003)

Oceanographic observations were made by Mr. W. Hansen of the Marine Sciences Branch, Department of the Environment.

En route to Station P Line P oceanographic stations 1 to 10 were occupied. A Bissett-Berman Model 9040 STD was used at these stations to obtain continuous temperature and salinity records to near bottom or 1500 meters (approximately). At stations 4 and 9 the sample depths were extended to 2400 and 3500 meters respectively with Nansen bottle casts. Mechanical or XBT casts to 275 meters were made and surface salinity samples taken at all Line P oceanographic and BT stations.

On Station P profiles of salinity, temperature and oxygen were obtained as follows:

- i) Weekly Nansen bottle casts to near bottom (4200 meters).
- ii) STD casts to 1500 meters with each Nansen bottle cast.
- iii) STD casts to 300 meters were made twice weekly.
- iv) Mechanical BT casts to 275 meters were made 8 times daily. A surface salinity sample was taken daily at 0000 hours GMT.

Other observations made and data obtained at Station P were as follows:

1. Biological and Productivity

Nineteen 50 and 150 meter, two 1200 meter vertical plankton hauls and 6 ten minute horizontal tows were made. Daily samples for micro-organisms were taken from the seawater loop.

Samples for productivity studies were taken as follows:

- a) Three 50 meter Van Doren casts for nitrate, plant pigment and photosynthesis sample.

- b) Surface samples every other week for the above.
- c) Surface nitrate samples on Line P stations outbound and inbound.
- d) Weekly sechi disc depth readings.

## II. Marine Geochemistry

Samples for marine geochemical studies were taken as follows:

- a) Weekly oxygen samples from the hydrographic casts.
- b) Daily surface nutrient samples plus hourly samples for one 24 hour period.
- c) Weekly alkalinity samples from the surface and 10 meters and at all depths from one hydrographic cast.
- d) Two surface  $C^{14}O_2$  samples from the ships' seawater loop.
- e) Weekly duplicate air samples for  $CO_2$  analysis.

## III. Marine Mammal, Bird and Observations for other Institutes

- a) Marine mammal and bird observations were kept.
- b) A fish sampling program was set up on this patrol.

En route from Station P Station 12 and Stations 8 to 1 were occupied. STD casts to 1500 meters or near bottom were made. Mechanical BT casts to 275 meters were made and a surface salinity sample was taken at all Line P stations.

Data was processed by Messrs. B. Minkley, C. de Jong, W. Hansen and D. Smith, and assembled and edited for publication by Mr. K. Abbott-Smith.

## Observational Procedures

Temperatures at depth were measured by deep-sea reversing thermometers of German (Richter and Wiese) or Japanese (Yoshino Keiki Co.) manufacture. Two protected thermometers were used on all Nansen bottles, and one unprotected thermometer

was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be  $\pm 0.02^{\circ}\text{C}$ .

Surface water temperatures were measured from a bucket sample using a deck thermometer of  $\pm 0.1^{\circ}\text{C}$  accuracy.

Salinity determinations were made at sea with an Auto-Lab Model 601 MK III inductive salinometer on Cruise P-71-1, with a Bissett-Berman Model 6220 Lab Salinometer on P-71-2, and an Auto-Lab Model 601 MK III inductive salinometer on Cruise P-71-3. Accuracy using duplicate determinations is estimated to be  $\pm 0.003$  ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of  $\pm 5$  m for depths less than 1000 m, and  $\pm 0.5\%$  of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Salinity-temperature-pressure data were obtained with a Bissett-Berman Model 9040 on Cruises P-71-1 and P-71-3, and a Bissett-Berman Model 9006 on Cruise P-71-2.

### Computations

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 563 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity and dissolved oxygen vs.  $\log_{10}$  depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Analog records from the salinity-temperature-pressure instrument have been hand digitized, then replotted using the Calcomp Plotter. Digitization was continued until original and computer plotted traces were coincident. Temperature and

salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (decibars Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in meters
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of $10^8$ ergs/cm <sup>2</sup>
OXY	is the concentration of dissolved oxygen expressed in mililiters per liter
V-B PERIOD	is the Vaisälä-Brunt period in minutes

#### Summary of Hydrographic Data

The data are graphical summarized as follows:

Composite plot of temperature vs.  $\text{Log}_{10}$  depth (Figs. 4, 5, P-71-1), (Fig. 13, P-71-2) and (Figs. 19, 20, P-71-3), composite plot of salinity vs.  $\text{Log}_{10}$  depth (Figs. 6, 7, P-71-1), (Fig. 14, P-71-2) and (Figs. 21, 22, P-71-3) and composite plot of oxygen vs.  $\text{Log}_{10}$  depth (Figs. 8, 9, P-71-1), (Fig. 15, P-71-2) and (Figs. 23, 24, P-71-3).



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- Collins, C.A., R.L. Tripe, D.A. Healey, and J. Jorgensen, 1969. The Time Distribution of Serial Oceanographic Data from the Ocean Station P Program. Fisheries Research Board of Canada, Technical Report No. 106.
- Reiniger, R.F. and C.K. Ross, 1968. A Method of Interpolation with Application to Oceanographic Data. Deep Sea Re. 15: 185-193.
- U.S.N. Hydrographic Office, 1955. Instruction Manual for Oceanographic Observations, Publication No. 607.



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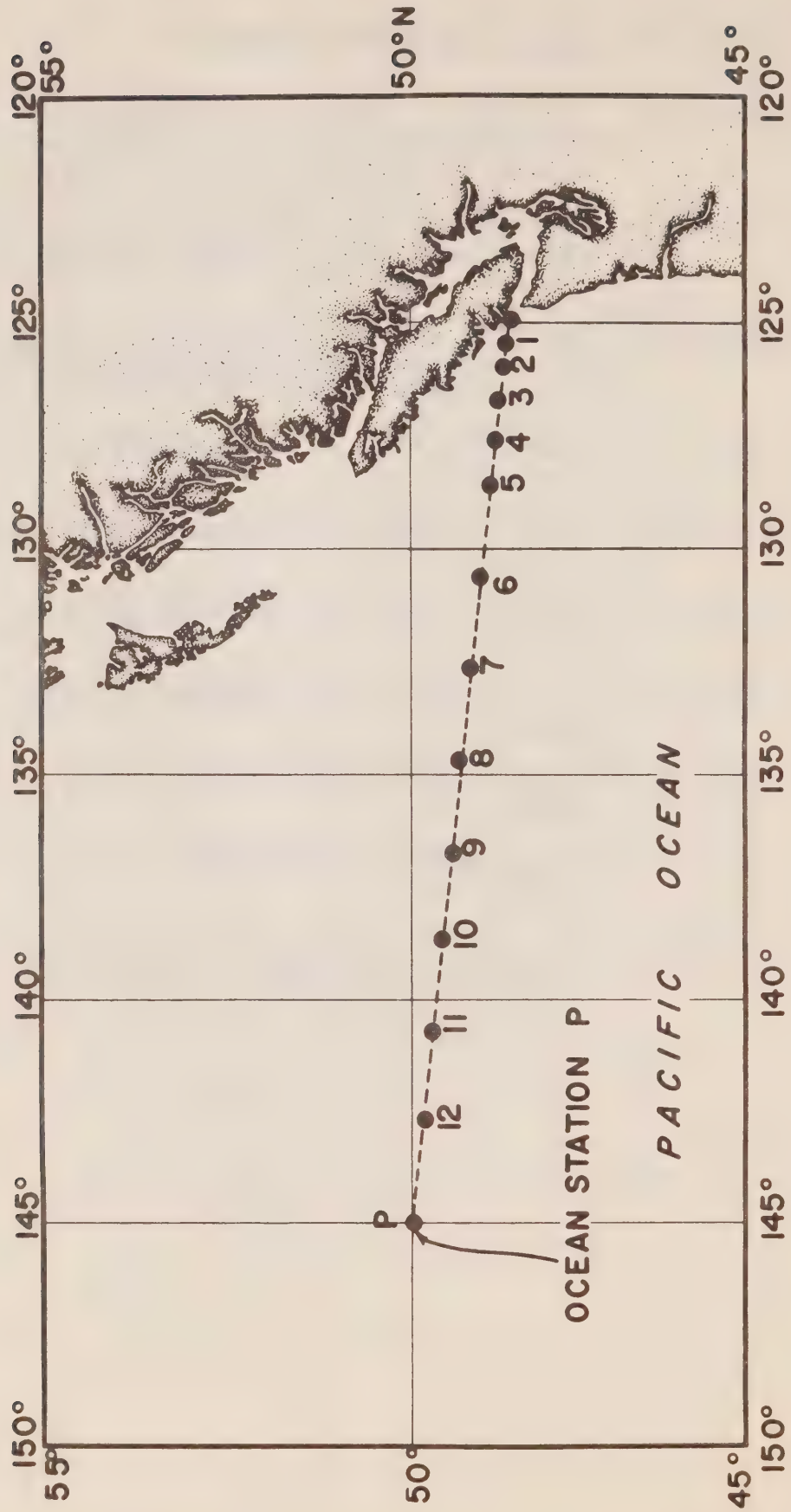


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-71-1

(C.O.D.C. REFERENCE No. 02-71-001)

# SALINITY DIFFERENCE, NANSEN - S.T.D., ‰

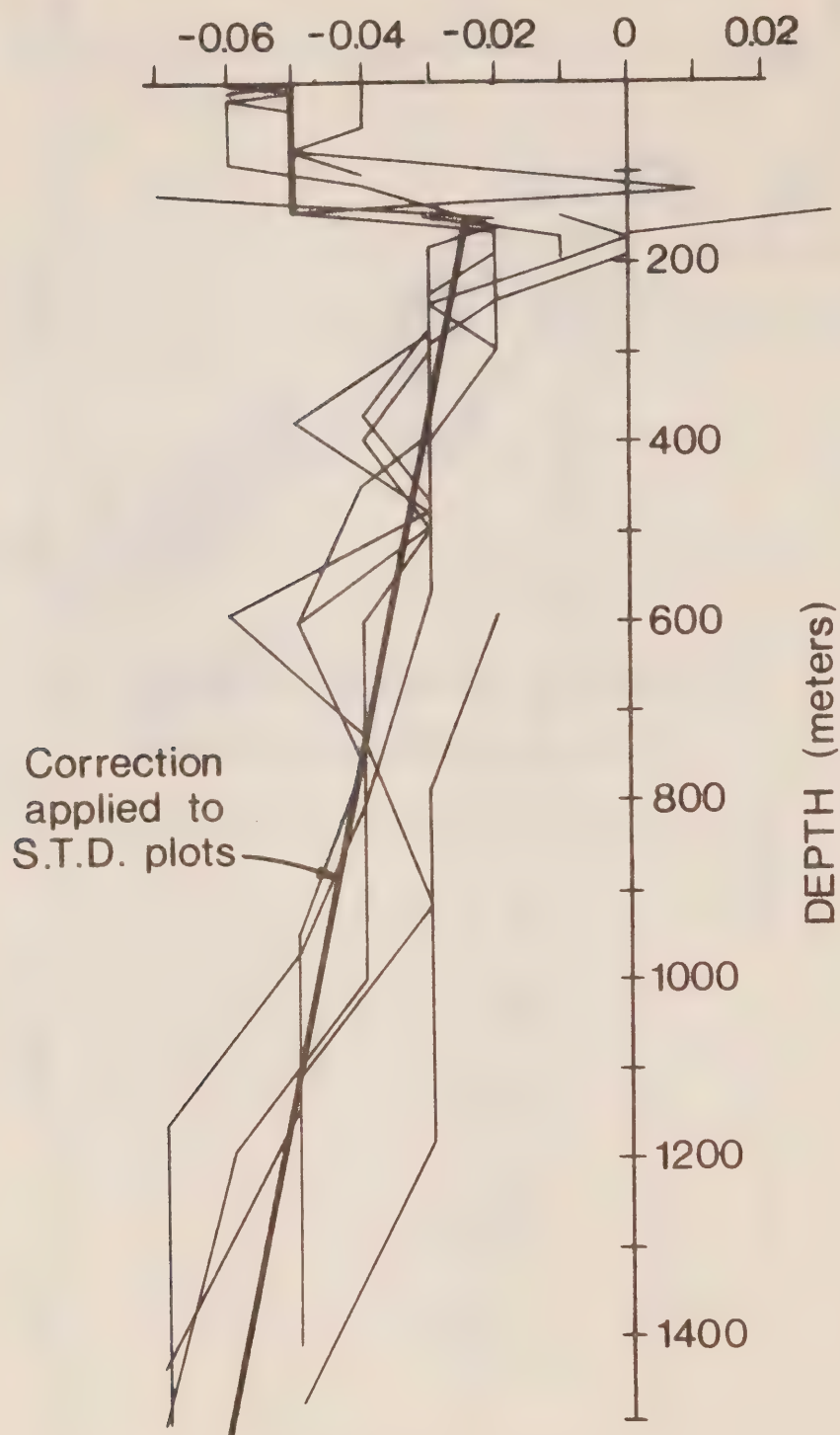


Fig. 2

Profiles of the differences in salinity values obtained from bottles and from a Bissett-Berman Model 9040 STD P-71-1.



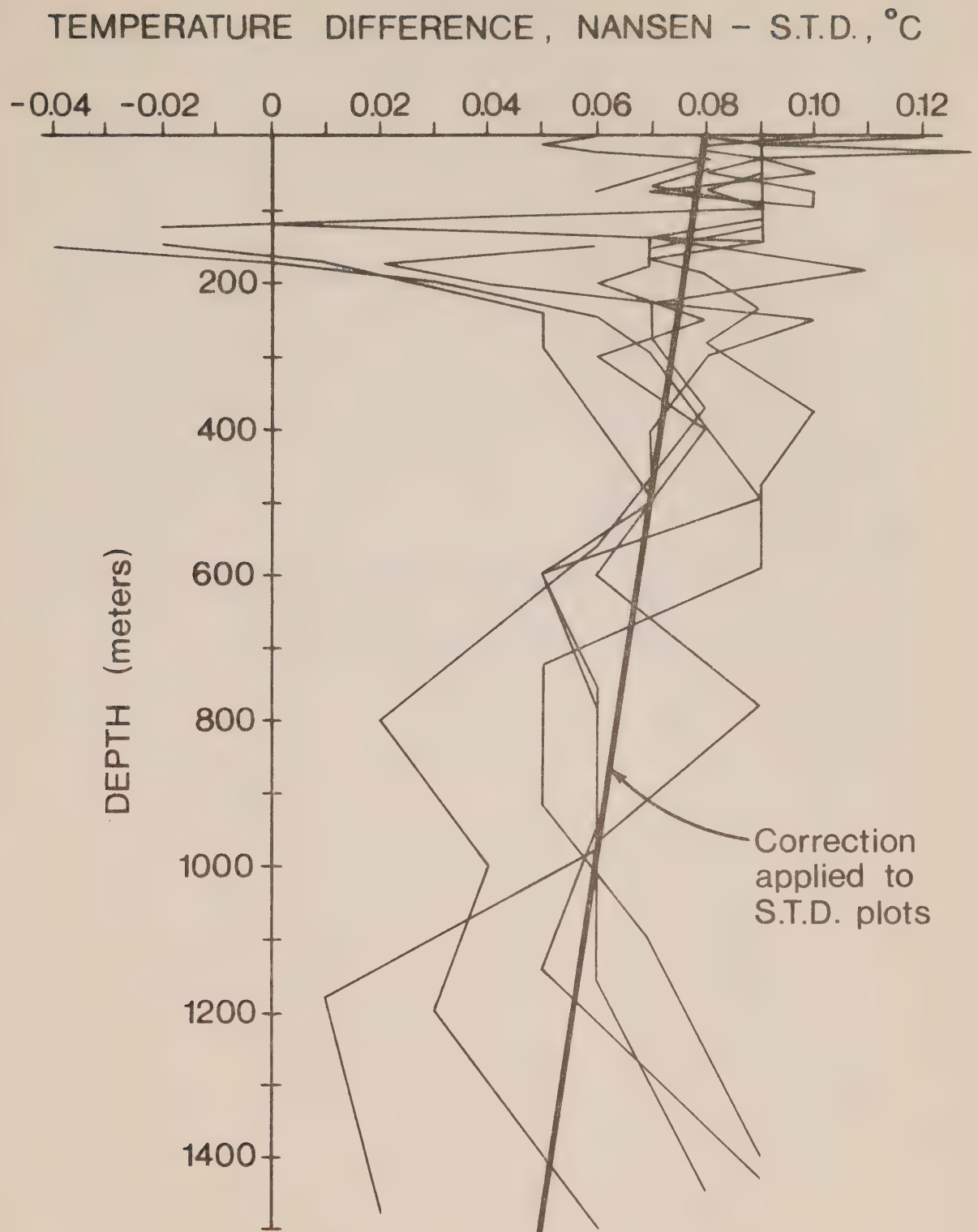


Fig. 3 Profiles of the differences in temperature obtained from reversing thermometers and a Bissett-Berman Model 9040 STD P-71-1.



COMPOSITE PLOTS OF TEMPERATURE, SALINITY  
AND DISSOLVED OXYGEN VS. DEPTH  
(P-71-1)

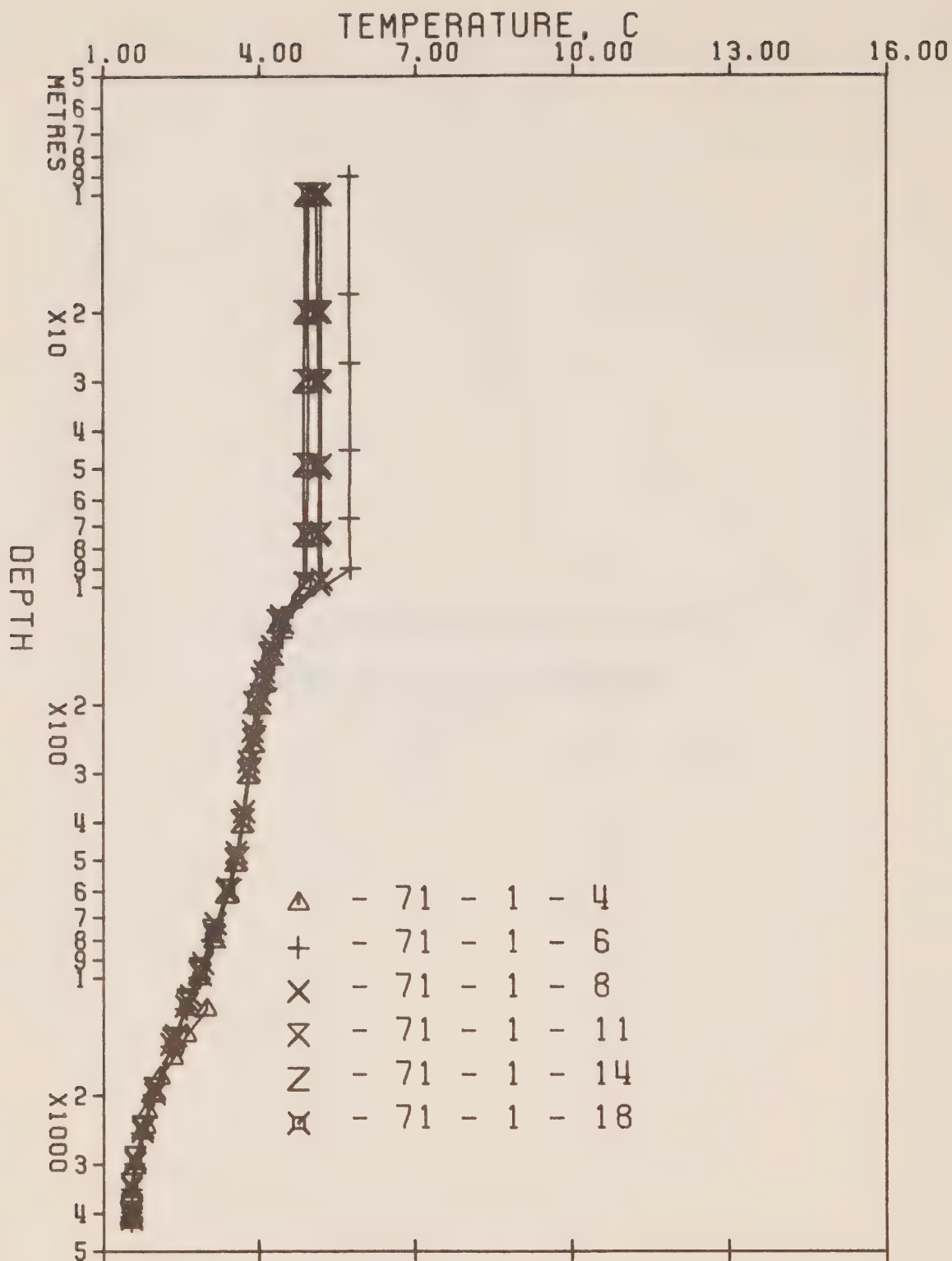


Fig. 4 Composite Plot of temperature vs.  $\text{Log}_{10}$  Depth P-71-1.

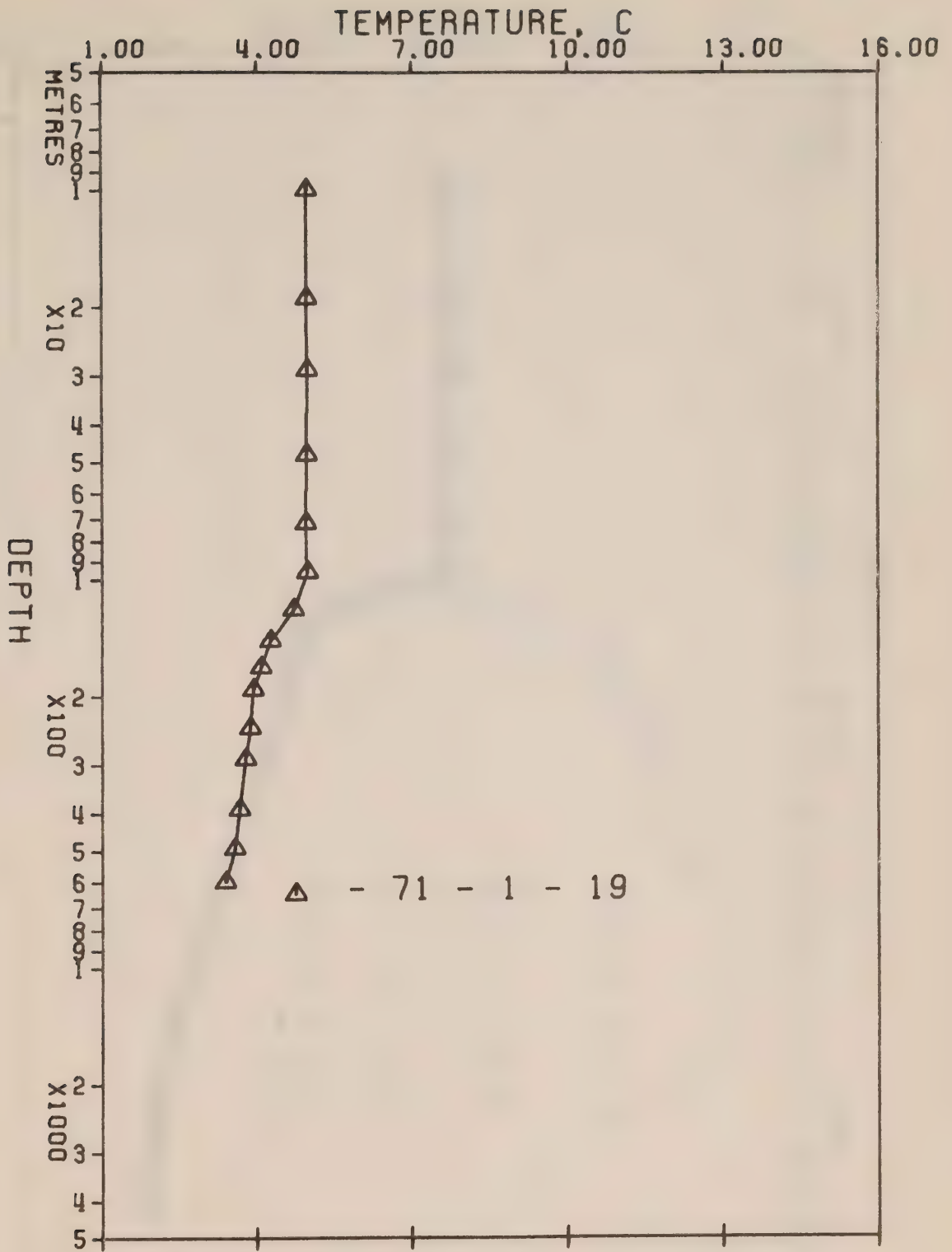


Fig. 5 Composite Plot of temperature vs.  $\text{Log}_{10}$  Depth P-71-1.



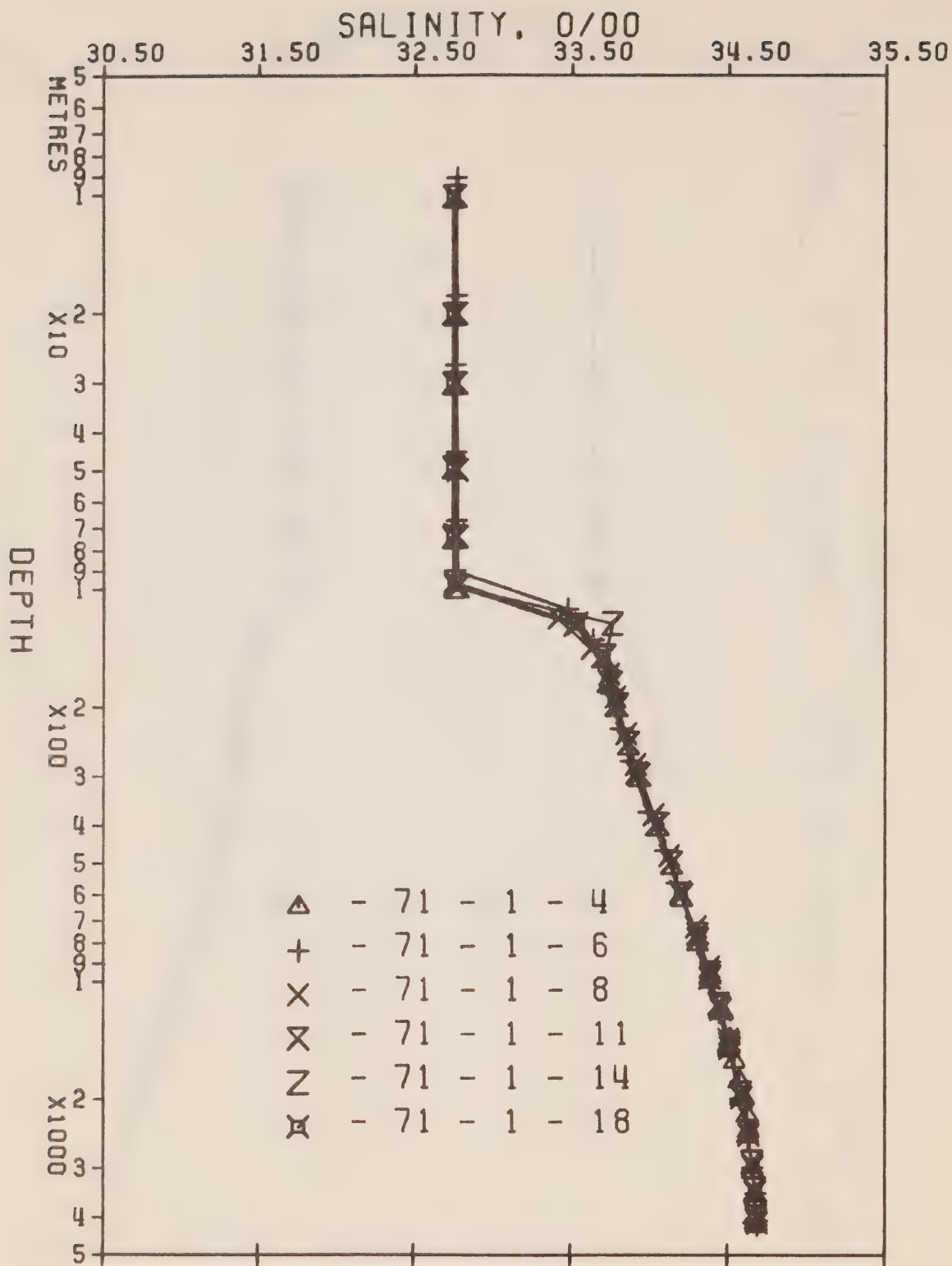


Fig. 6 Composite Plot of salinity vs. Log Depth P-71-1.

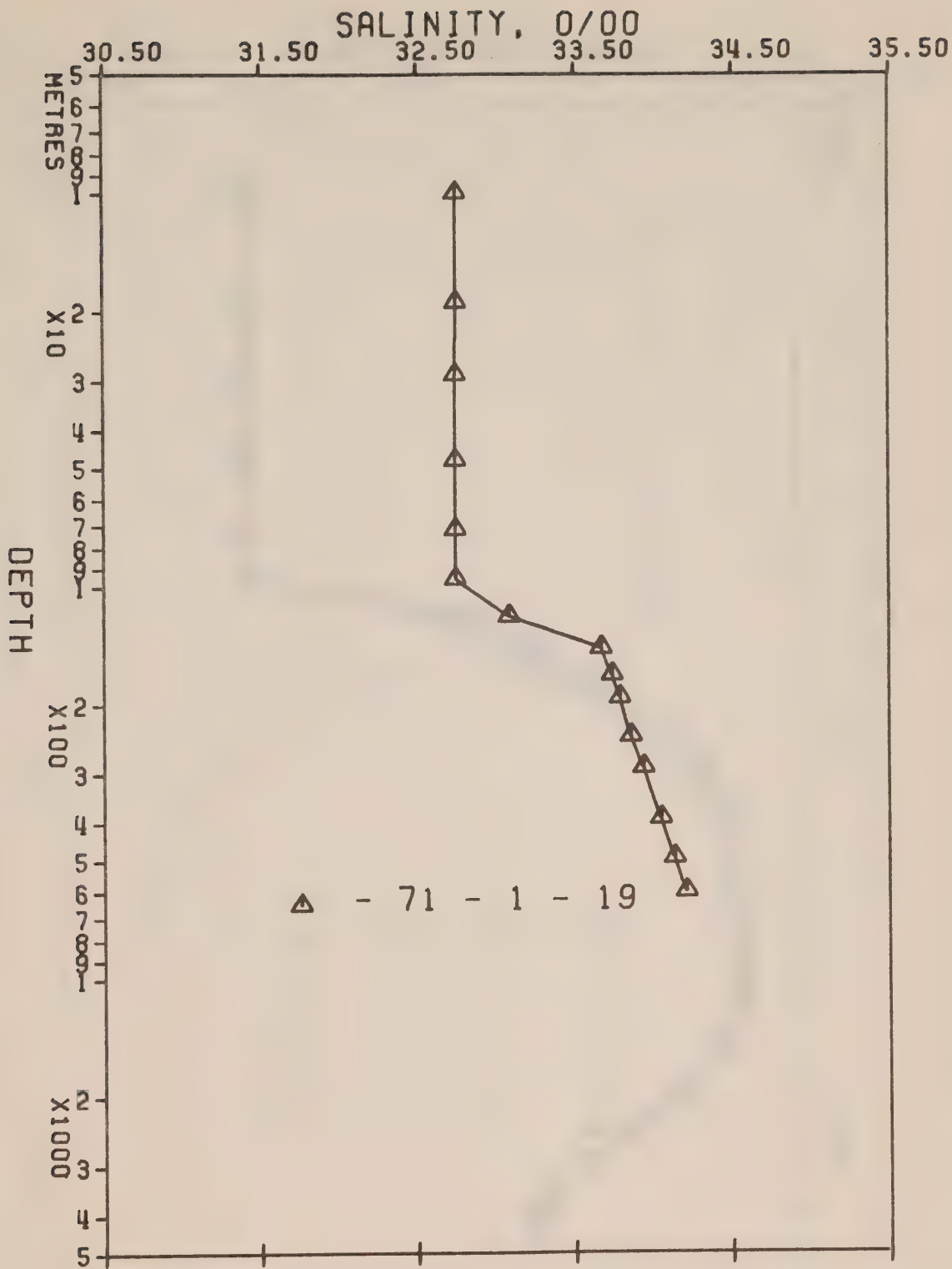


Fig. 7 Composite Plot of salinity vs.  $\text{Log}_{10}$   
Depth P-71-1.

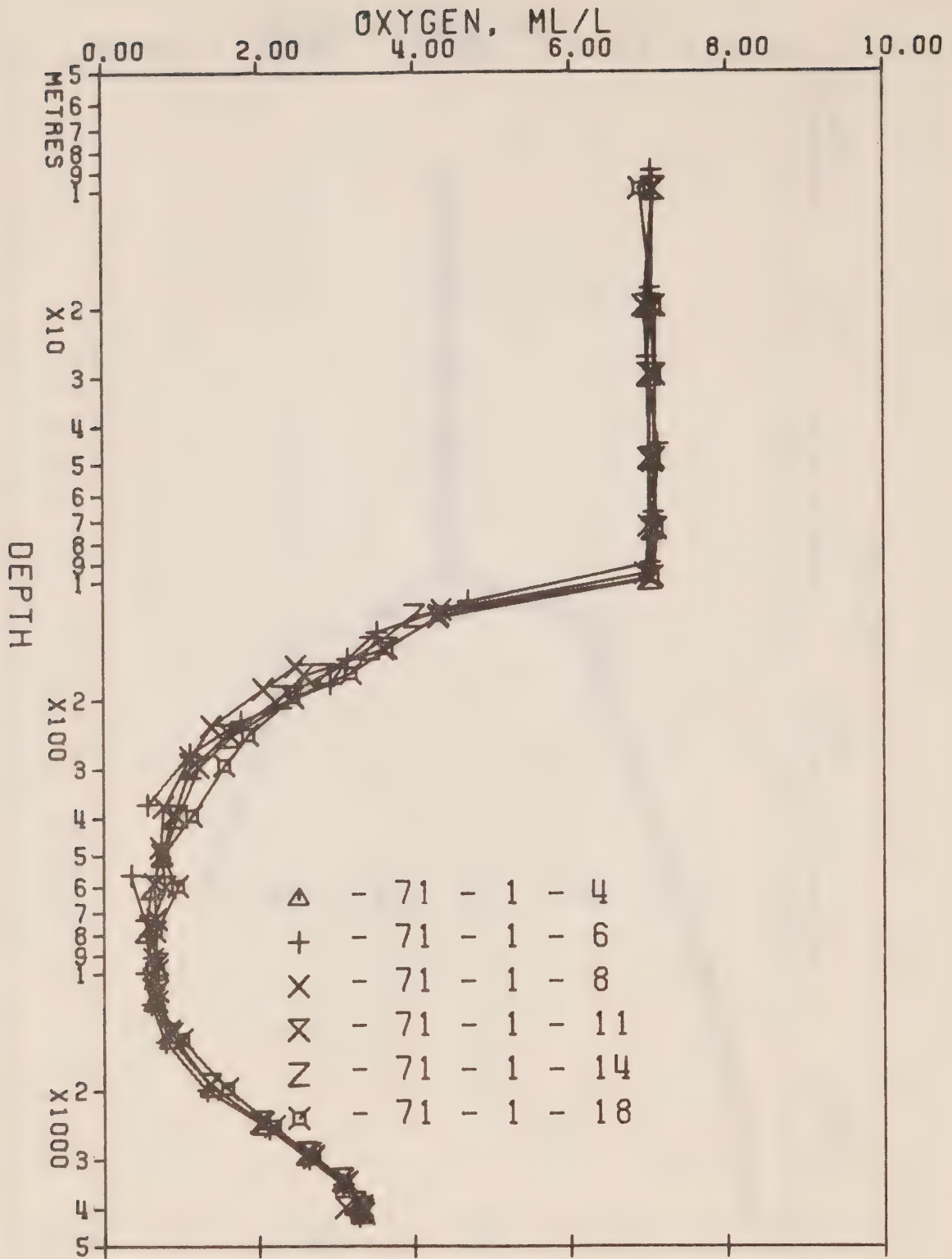


Fig. 8 Composite Plot of oxygen vs.  $\text{Log}_{10}$  Depth P-71-1.

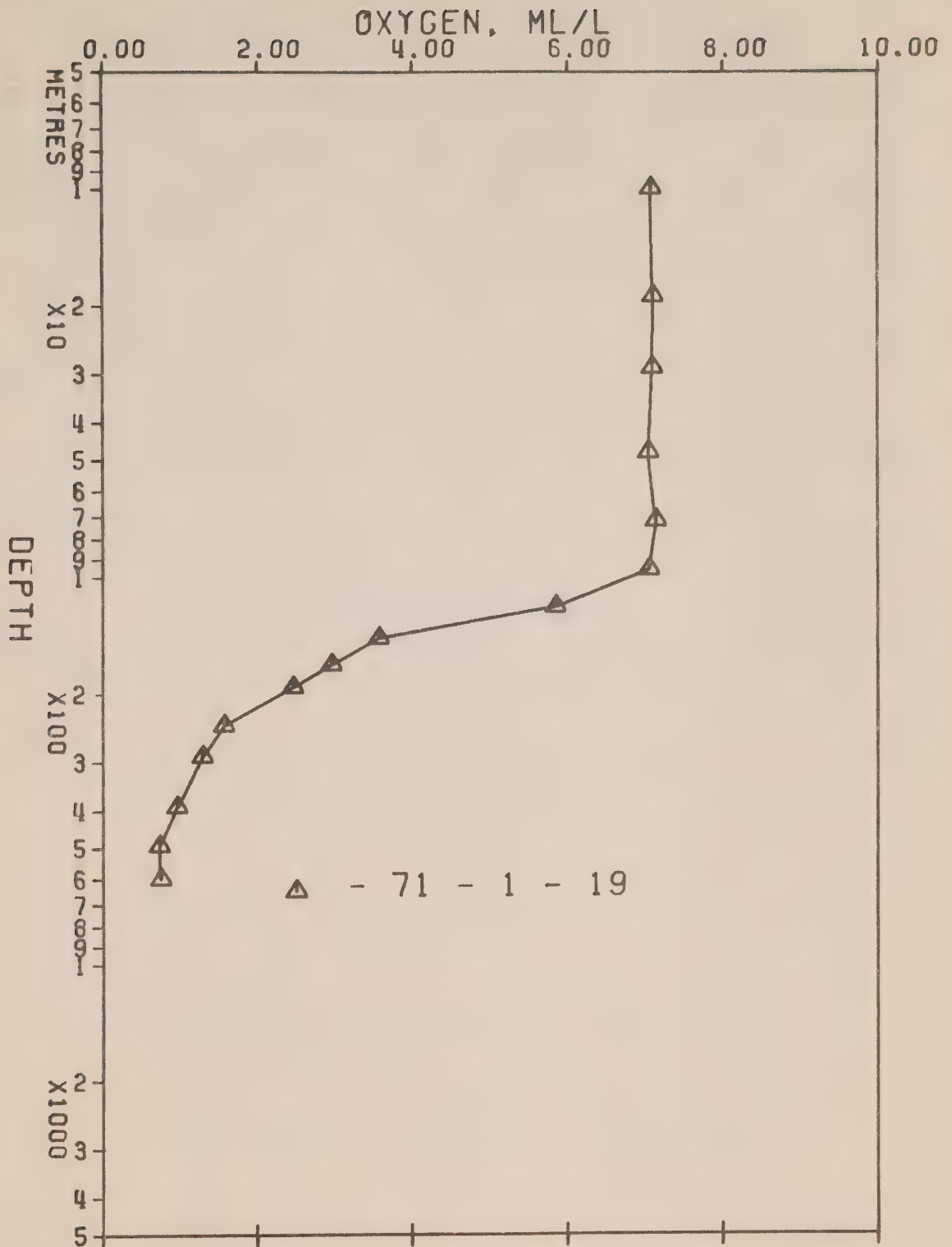
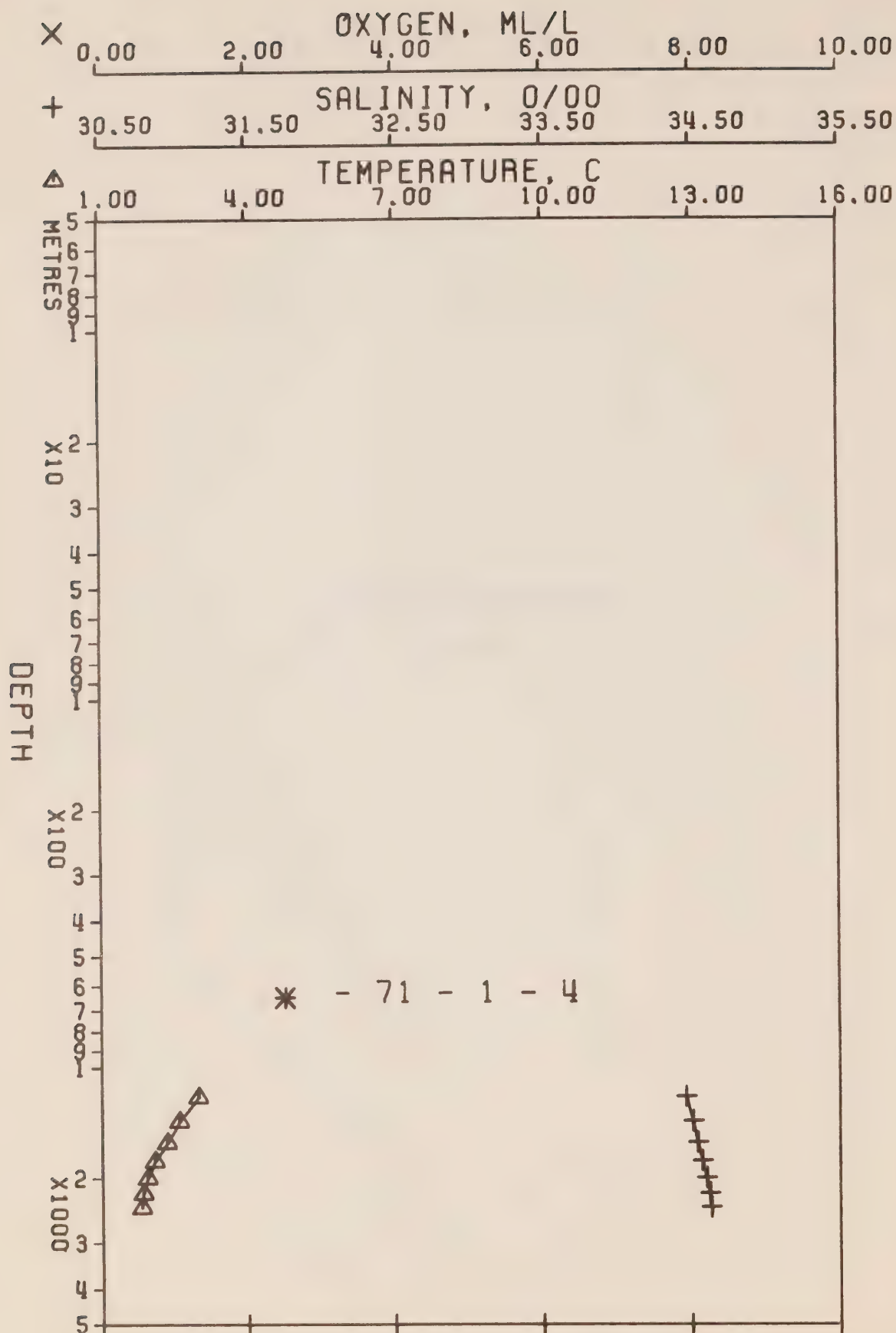


Fig. 9 Composite Plot of oxygen vs.  $\text{Log}_{10}$  Depth P-71-1.





RESULTS OF BOTTLE CASTS  
(P-71-1)



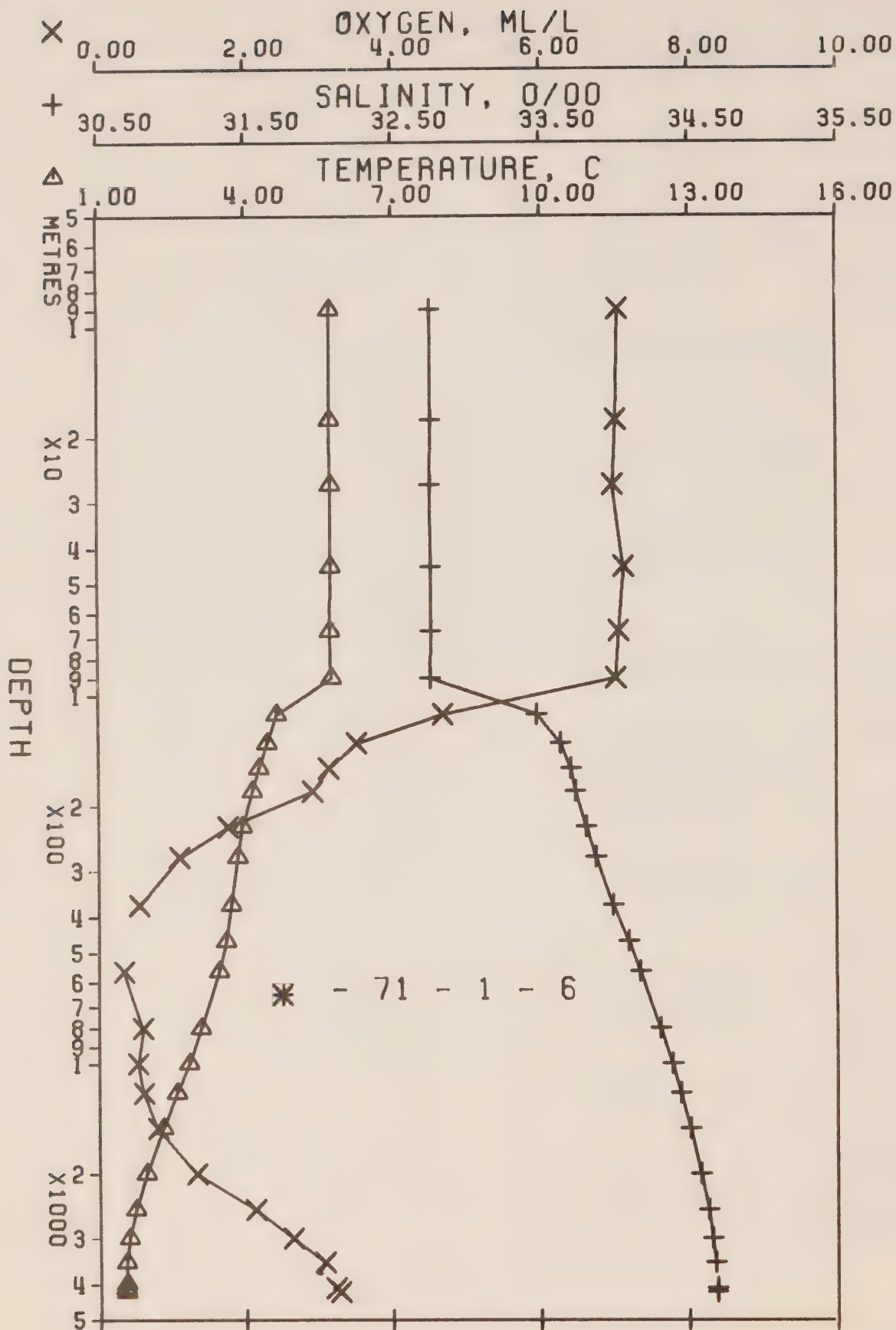
PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71-1-4 DATE 9/ 1/71

POSITION 48-46.0 N, 127-40.0 W GMT 11.2

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
1220	2.97	34.466	1207	27.486	68.8	2.88	59.9	0.0	0.0	0.0	1482.
1420	2.58	34.509	1404	27.555	62.4	2.48	53.3	1.83	15.36	0.0	1483.
1620	2.32	34.539	1601	27.601	58.2	2.21	48.9	3.04	34.00	0.0	1486.
1821	2.06	34.572	1799	27.649	53.6	1.94	44.4	4.16	53.69	0.0	1488.
2023	1.91	34.602	1998	27.684	50.4	1.77	40.9	5.21	74.23	0.0	1491.
2228	1.83	34.621	2199	27.706	48.8	1.67	38.8	6.22	96.15	0.0	1494.
2434	1.79	34.632	2402	27.718	48.2	1.62	37.5	7.22	119.96	0.0	1497.



## PACIFIC OCEANOGRAPHIC GROUP

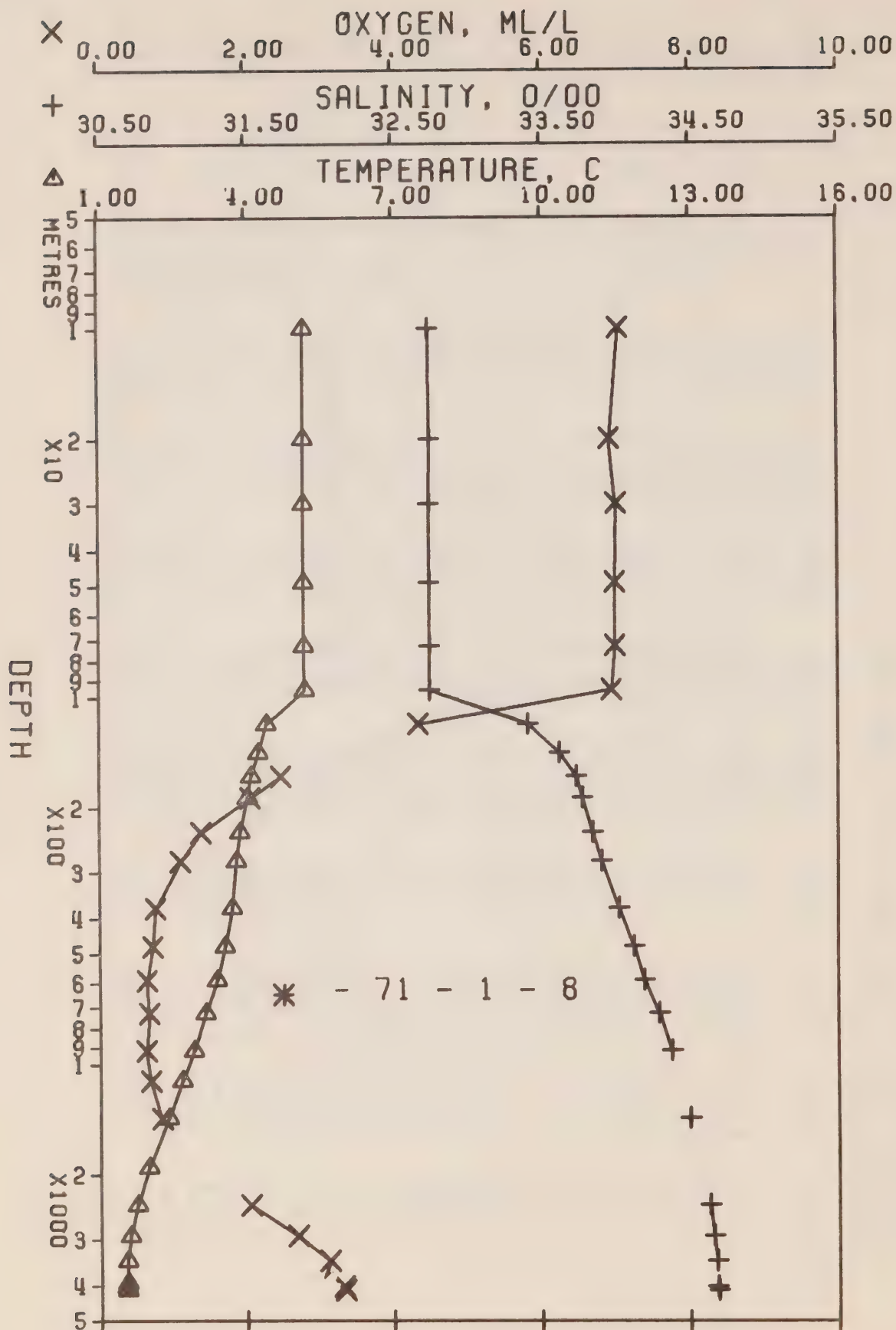
REFERENCE NO. 71- 1- 6 DATE 13/ 1/71

POSITION 49-54.0 N, 144-51.0 W GMT 20.4

## HYDROGRAPHIC CAST DATA

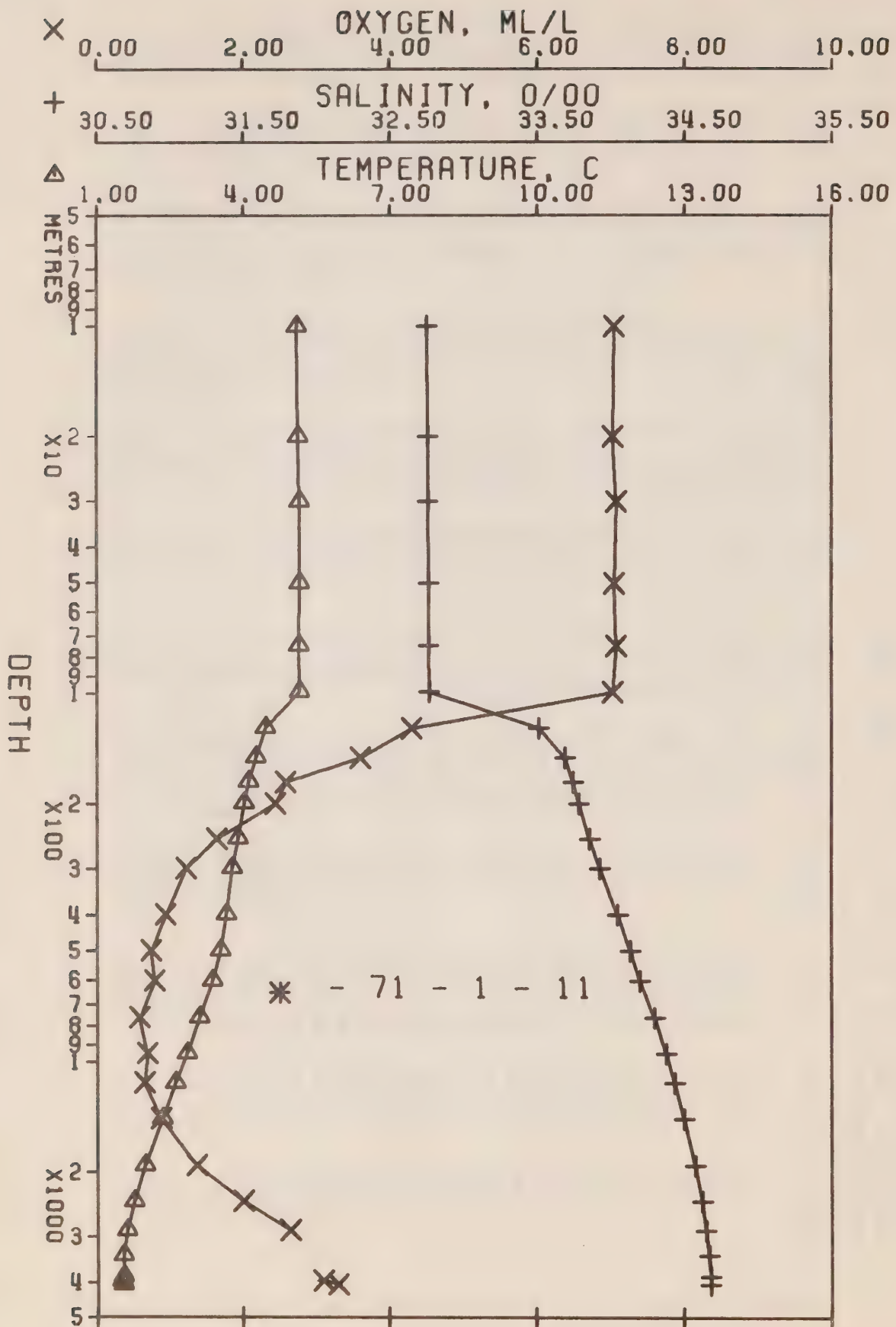
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
0	5.75	32.765	0	25.844	216.7	5.75	216.4	0.0	0.0	7.15	1471.
9	5.73	32.767	9	25.848	216.4	5.73	216.1	0.20	0.01	7.05	1471.
18	5.73	32.764	18	25.845	216.8	5.73	216.2	0.39	0.04	7.02	1471.
27	5.74	32.761	27	25.842	217.1	5.74	216.6	0.59	0.08	6.98	1472.
45	5.74	32.763	45	25.843	217.2	5.74	216.4	0.98	0.23	7.13	1472.
67	5.73	32.763	67	25.845	217.3	5.72	216.3	1.46	0.50	7.06	1472.
91	5.75	32.761	90	25.841	218.0	5.74	216.7	1.98	0.92	7.02	1473.
114	4.63	33.482	113	26.539	151.8	4.62	150.4	2.41	1.36	4.68	1469.
136	4.44	33.642	135	26.686	137.9	4.43	136.4	2.72	1.76	3.51	1469.
159	4.27	33.709	158	26.757	131.4	4.26	129.6	3.03	2.23	3.13	1469.
183	4.14	33.739	182	26.794	127.9	4.13	126.1	3.34	2.78	2.91	1469.
230	3.93	33.814	228	26.875	120.6	3.91	118.4	3.92	3.99	1.76	1469.
277	3.84	33.879	275	26.936	115.2	3.82	112.6	4.48	5.43	1.10	1469.
373	3.70	33.996	370	27.043	105.8	3.67	102.4	5.54	8.93	0.55	1470.
469	3.59	34.098	465	27.135	97.7	3.56	93.6	6.51	13.11	0.0	1472.
565	3.44	34.176	560	27.212	91.1	3.40	86.3	7.41	17.88	0.34	1473.
807	3.07	34.310	800	27.353	78.9	3.02	72.8	9.46	32.19	0.60	1475.
1009	2.83	34.390	999	27.438	71.6	2.76	64.6	10.97	46.17	0.53	1478.
1210	2.58	34.444	1198	27.503	66.0	2.50	58.4	12.35	61.82	0.61	1480.
1514	2.29	34.512	1497	27.582	59.3	2.19	50.8	14.25	88.10	0.80	1484.
2018	1.94	34.582	1993	27.666	52.2	1.80	42.6	17.03	138.26	1.33	1491.
2523	1.72	34.630	2489	27.721	47.8	1.54	37.1	19.54	196.34	2.13	1498.
3029	1.59	34.654	2985	27.750	45.9	1.37	34.1	21.90	263.16	2.64	1506.
3538	1.53	34.674	3482	27.771	45.1	1.26	31.8	24.21	340.24	3.07	1515.
4048	1.52	34.683*	3980	27.779	45.6	1.19	30.7	26.52	429.57		1524.
4151	1.51	34.684	4080	27.780	45.7	1.17	30.6	26.98	449.12	3.22	1525.
4252	1.53	34.685	4179	27.780	46.2	1.18	30.5	27.45	469.11	3.28	1527.





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 1- 8 DATE 18/ 1/71  
 POSITION 50-16.0 N, 145- 7.0 W GMT 19.4  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	UXY	SOUND
0	5.20	32.752	0	25.898	211.6	5.20	211.4	0.0	0.0	7.25	1469.
10	5.18	32.749	10	25.898	211.7	5.18	211.4	0.21	0.01	7.05	1469.
20	5.18	32.753	20	25.901	211.5	5.18	211.0	0.43	0.04	6.93	1469.
30	5.19	32.751	30	25.898	211.8	5.19	211.3	0.64	0.10	7.02	1469.
49	5.19	32.751	49	25.898	212.0	5.19	211.3	1.04	0.26	7.00	1470.
73	5.19	32.749	73	25.897	212.4	5.18	211.4	1.56	0.58	7.00	1470.
97	5.20	32.750	96	25.896	212.6	5.19	211.4	2.06	1.02	6.95	1470.
120	4.40	33.415	119	26.510	154.5	4.39	153.1	2.49	1.49	4.34	1463.
143	4.24	33.625	142	26.694	137.2	4.23	135.7	2.82	1.93	0.0	1463.
166	4.09	33.742	165	26.802	127.1	4.08	125.4	3.12	2.41	2.47	1463.
189	4.01	33.782	188	26.842	123.5	4.00	121.5	3.41	2.94	2.05	1463.
236	3.86	33.849	234	26.910	117.3	3.84	115.0	3.97	4.15	1.38	1469.
282	3.79	33.912	280	26.967	112.2	3.77	109.6	4.50	5.55	1.10	1469.
378	3.70	34.025	375	27.066	103.7	3.67	100.2	5.53	9.03	0.76	1470.
481	3.55	34.126	477	27.161	95.3	3.52	91.2	6.56	13.50	0.72	1472.
596	3.39	34.195	591	27.231	89.3	3.35	84.4	7.62	19.33	0.64	1473.
733	3.15	34.293	726	27.332	80.5	3.10	74.8	8.78	27.17	0.67	1474.
926	2.90	34.378	917	27.423	72.8	2.84	66.1	10.25	39.62	0.63	1477.
1121	2.66	34.437*	1110	27.491	66.9	2.58	59.5	11.61	53.81	0.69	1479.
1420	2.38	34.501	1405	27.566	60.7	2.28	52.3	13.51	78.44	0.84	1483.
1929	1.97	34.581*	1906	27.663	52.3	1.84	42.9	16.36	127.16	0.0	1489.
2447	1.73	34.631	2414	27.721	47.5	1.56	37.1	18.92	184.29	2.05	1497.
2967	1.59	34.654	2924	27.750	45.7	1.37	34.2	21.34	250.91	2.69	1505.
3484	1.53	34.676	3430	27.772	44.7	1.26	31.7	23.67	327.44	3.12	1514.
3994	1.52	34.674*	3927	27.771	46.1	1.20	31.5	25.98	415.72		1523.
4094	1.51	34.676	4025	27.774	46.1	1.18	31.2	26.44	434.83	3.31	1524.
4194	1.53	34.684	4122	27.779	46.1	1.18	30.6	26.90	454.22	3.33	1526.



PACIFIC OCEANOGRAPHIC GROUP

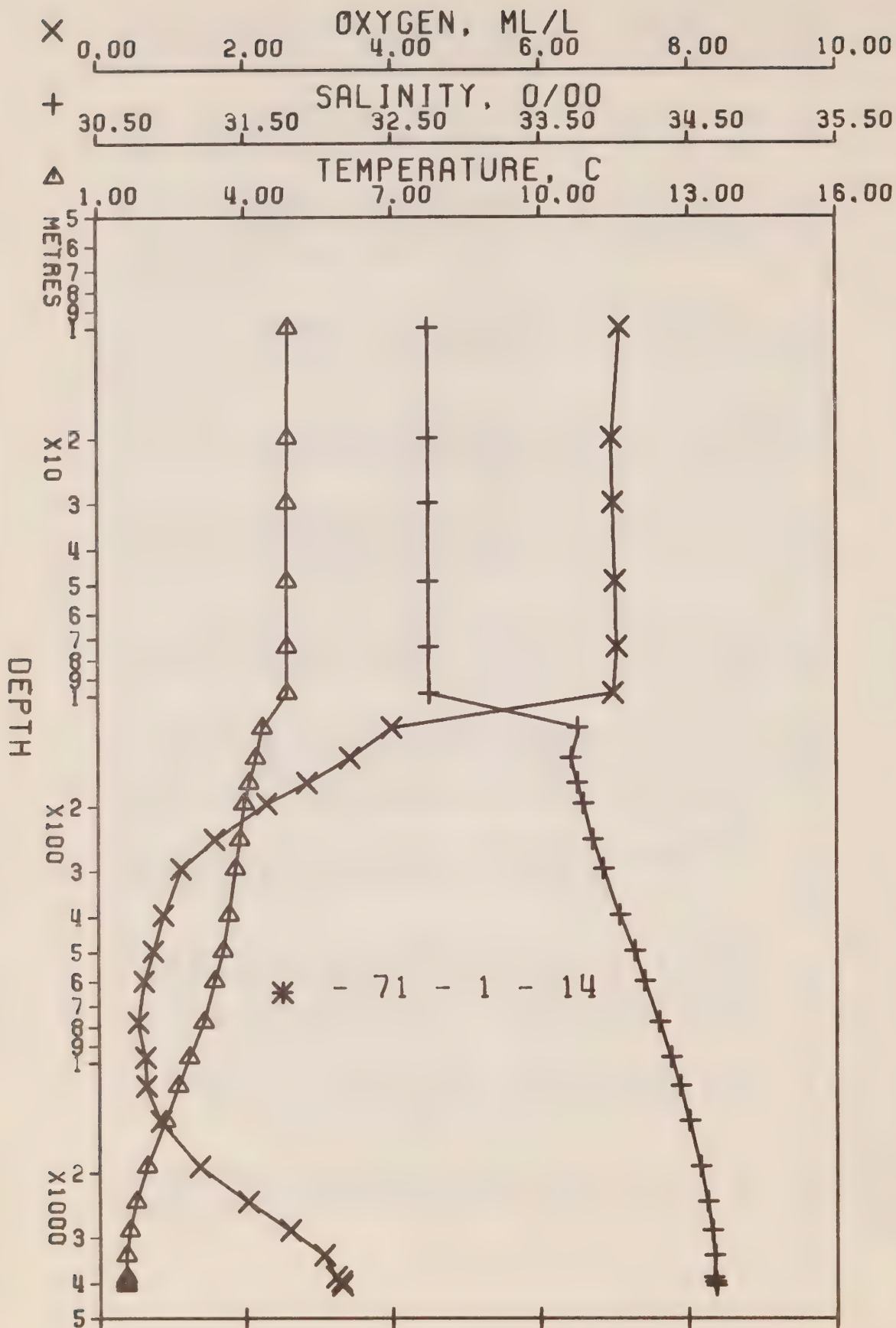
REFERENCE NO. 71- 1- 11 DATE 26/ 1/71

POSITION 50- 0.0 N, 144-53.0 W GMT 23.9

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.08	32.760	0	25.918	209.7	5.08	209.5	0.0	0.0	7.15	1468.
10	5.10	32.760	10	25.915	210.0	5.10	209.6	0.21	0.01	7.05	1469.
20	5.13	32.763	20	25.914	210.1	5.13	209.7	0.42	0.04	7.03	1469.
30	5.15	32.766	30	25.914	210.2	5.15	209.7	0.63	0.10	7.08	1469.
50	5.15	32.769	50	25.917	210.2	5.15	209.5	1.06	0.27	7.05	1469.
74	5.14	32.770	74	25.919	210.3	5.13	209.3	1.57	0.59	7.08	1470.
100	5.15	32.775	99	25.922	210.3	5.14	209.0	2.10	1.08	7.03	1470.
125	4.45	33.520	124	26.588	147.1	4.44	145.7	2.56	1.59	4.30	1469.
150	4.25	33.697	149	26.750	131.9	4.24	130.3	2.90	2.07	3.60	1469.
174	4.11	33.751	173	26.807	126.7	4.10	124.9	3.21	2.58	2.58	1468.
199	4.02	33.788	198	26.846	123.2	4.01	121.2	3.53	3.18	2.44	1469.
249	3.90	33.866	247	26.920	116.6	3.88	114.1	4.12	4.54	1.64	1469.
299	3.78	33.937	297	26.988	110.4	3.76	107.6	4.69	6.13	1.22	1469.
400	3.65	34.055	397	27.095	101.0	3.62	97.5	5.75	9.92	0.94	1471.
502	3.54	34.139	498	27.172	94.4	3.51	90.1	6.75	14.50	0.74	1472.
606	3.37	34.205	601	27.241	88.5	3.33	83.5	7.70	19.87	0.79	1473.
765	3.10	34.306	758	27.347	79.2	3.05	73.4	9.02	29.14	0.58	1475.
959	2.84	34.383	950	27.432	71.9	2.78	65.2	10.49	41.99	0.69	1477.
1154	2.60	34.442	1142	27.500	66.1	2.52	58.7	11.82	56.40	0.65	1479.
1447	2.34	34.504	1431	27.572	60.2	2.24	51.8	13.67	80.83	0.88	1483.
1938	1.98	34.578	1915	27.660	52.7	1.85	43.2	16.42	128.33	1.37	1490.
2434	1.75	34.623	2402	27.714	48.4	1.58	37.9	18.91	183.84	2.01	1497.
2933	1.60	34.650	2891	27.746	46.0	1.38	34.5	21.25	247.96	2.65	1505.
3434	1.53	34.668	3381	27.766	45.2	1.27	32.4	23.53	321.79	0.0	1513.
3936	1.52	34.678	3871	27.775	45.7	1.20	31.2	25.81	407.69		1522.
4037	1.50	34.679*	3969	27.777	45.5	1.17	30.9	26.27	426.31	3.10	1523.
4137	1.52	34.680	4067	27.776	46.1	1.18	30.9	26.73	445.48	3.30	1525.

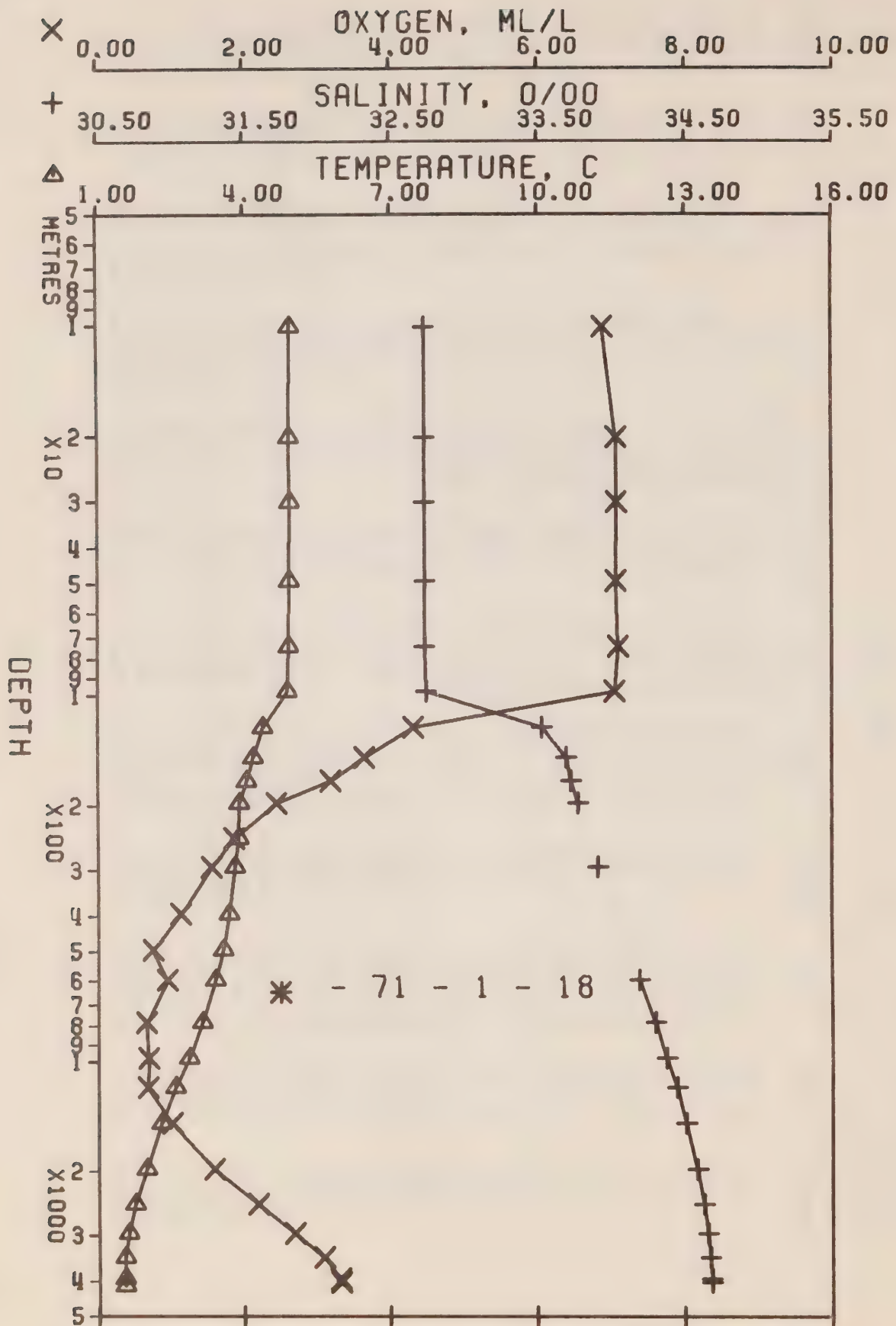






PACIFIC OCEANOGRAPHIC GROUP  
REFERENCE NO. 71- 1- 14 DATE 4/ 2/71  
POSITION 49-58.0 N, 145- 4.0 W GMT 19.5  
HYDROGRAPHIC CAST DATA

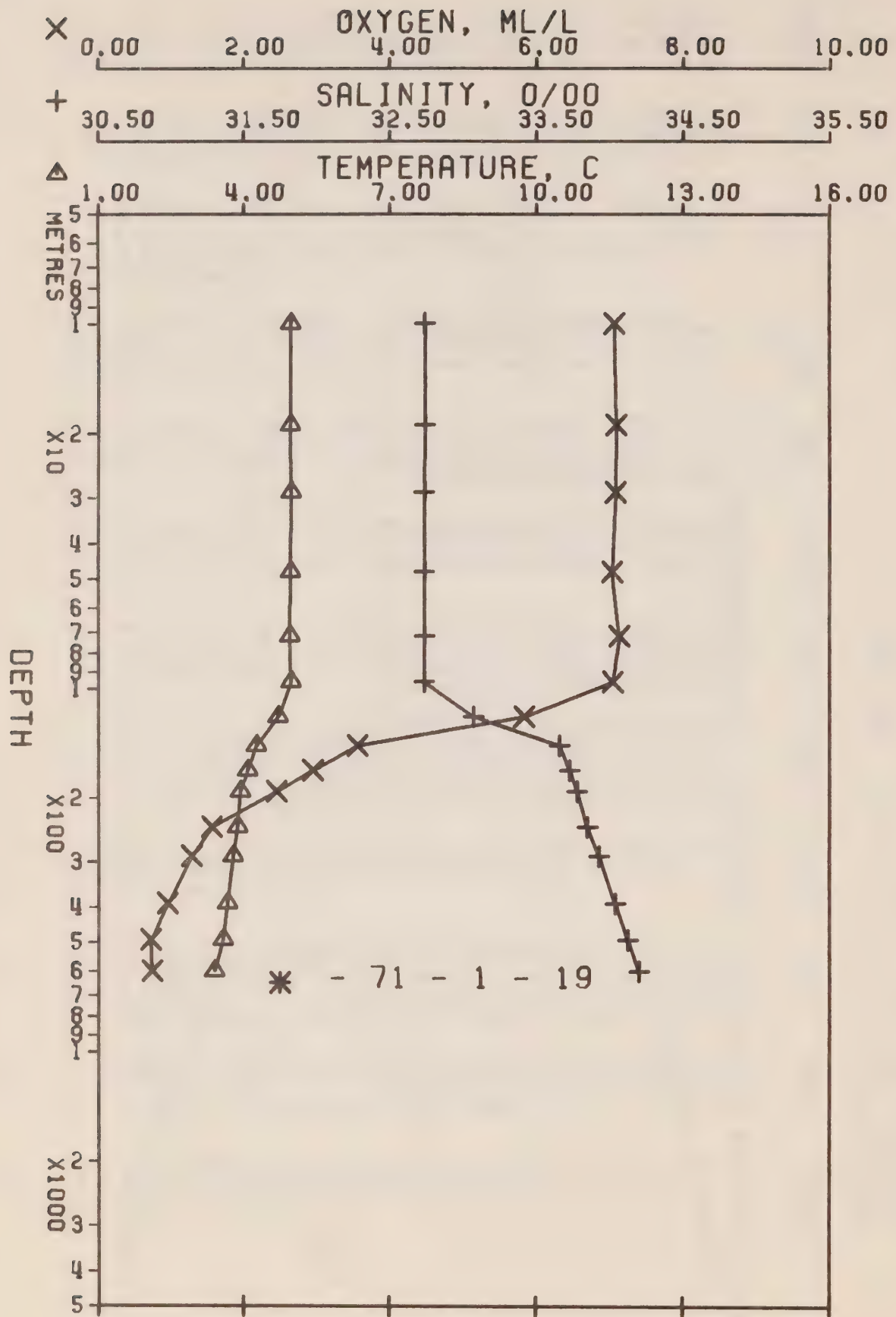
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.88	32.753	0	25.934	208.0	4.88	207.8	0.0	0.0	7.09	1468.
10	4.88	32.751	10	25.933	208.3	4.88	208.0	0.21	0.01	7.08	1468.
20	4.87	32.752	20	25.935	208.2	4.87	207.8	0.42	0.04	6.97	1468.
30	4.86	32.752	30	25.936	208.2	4.86	207.7	0.63	0.10	6.99	1468.
49	4.86	32.751	49	25.935	208.5	4.86	207.7	1.03	0.26	7.02	1468.
74	4.86	32.751	74	25.935	208.7	4.85	207.7	1.55	0.59	7.04	1469.
100	4.86	32.755	99	25.938	208.6	4.85	207.5	2.09	1.07	6.99	1469.
124	4.34	33.762	123	26.792	127.8	4.33	126.3	2.50	1.53	3.99	1469.
149	4.21	33.708	148	26.763	130.7	4.20	129.1	2.81	1.97	3.42	1468.
174	4.08	33.756	173	26.814	126.0	4.07	124.3	3.13	2.50	2.84	1468.
198	3.97	33.793	197	26.855	122.3	3.96	120.4	3.44	3.07	2.29	1468.
249	3.88	33.859	247	26.916	116.9	3.86	114.5	4.04	4.45	1.58	1469.
299	3.79	33.931	297	26.982	110.9	3.77	108.2	4.61	6.05	1.12	1469.
400	3.65	34.042	397	27.085	102.0	3.62	98.4	5.68	9.87	0.88	1471.
502	3.54	34.139	498	27.172	94.4	3.51	90.1	6.68	14.47	0.74	1472.
605	3.36	34.206	600	27.243	88.3	3.32	83.3	7.62	19.77	0.61	1473.
786	3.13	34.303	779	27.342	79.8	3.08	73.8	9.14	30.53	0.53	1475.
981	2.83	34.383	971	27.433	72.0	2.76	65.1	10.61	43.77	0.63	1477.
1175	2.60	34.443	1163	27.501	66.2	2.52	58.6	11.95	58.48	0.64	1479.
1465	2.33	34.506	1449	27.574	60.0	2.23	51.6	13.77	82.99	0.84	1483.
1948	1.96	34.581	1924	27.664	52.3	1.83	42.8	16.46	129.69	1.37	1490.
2434	1.74	34.623	2402	27.714	48.2	1.57	37.9	18.89	184.01	2.03	1497.
2925	1.60	34.656	2883	27.751	45.5	1.39	34.1	21.18	246.53	2.60	1505.
3424	1.53	34.668	3371	27.766	45.2	1.27	32.4	23.43	319.37	3.06	1513.
3934	1.52	34.667	3869	27.766	46.4	1.20	32.0	25.78	407.58	3.22	1522.
4039	1.51	34.674	3971	27.772	46.0	1.18	31.4	26.26	427.23	3.29	1523.
4143	1.53	34.680	4072	27.776	46.3	1.19	31.0	26.74	447.17	3.30	1525.



## PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 18 DATE 9/ 2/71  
 POSITION 49-59.0 N, 145- 1.0 W GMT 20.4  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
IHC210I	PROGRAM	INTERRUPT(P)	OLD PSW	IS	FF25000F4204797C						
0	4.95	32.741	0	25.917	209.7	4.95	209.5	0.0	0.0	7.37	1468.
10	4.94	32.741	10	25.918	209.7	4.94	209.4	0.21	0.01	6.89	1468.
20	4.93	32.741	20	25.919	209.7	4.93	209.3	0.42	0.04	7.08	1468.
30	4.94	32.740	30	25.917	209.9	4.94	209.5	0.63	0.10	7.08	1468.
49	4.93	32.739	49	25.918	210.1	4.93	209.4	1.04	0.26	7.07	1469.
74	4.92	32.740	74	25.920	210.1	4.91	209.2	1.56	0.59	7.10	1469.
99	4.88	32.750	98	25.932	209.2	4.87	208.0	2.08	1.05	7.05	1469.
124	4.38	33.534	123	26.607	145.3	4.37	143.9	2.53	1.55	4.31	1468.
149	4.18	33.700	148	26.759	131.0	4.17	129.4	2.87	2.03	3.64	1468.
173	4.05	33.732	172	26.798	127.5	4.04	125.7	3.18	2.54	3.18	1468.
198	3.90	33.780	197	26.851	122.6	3.89	120.6	3.49	3.14	2.44	1468.
248	3.88	33.855*	246	26.913	117.2	3.86	114.8	4.08	4.48	1.86	1469.
297	3.80	33.917	295	26.970	112.1	3.78	109.3	4.65	6.05	1.55	1469.
398	3.68	34.026*	395	27.069	103.5	3.65	99.9	5.74	9.90	1.13	1471.
499	3.56	34.117*	495	27.153	96.3	3.53	91.9	6.74	14.51	0.75	1472.
602	3.40	34.195	597	27.230	89.5	3.36	84.5	7.70	19.88	0.95	1473.
790	3.13	34.304	783	27.343	79.9	3.08	73.7	9.28	31.12	0.66	1475.
990	2.86	34.378	980	27.426	72.7	2.79	65.8	10.80	44.89	0.69	1477.
1190	2.58	34.448	1178	27.507	65.6	2.50	58.1	12.19	60.26	0.68	1480.
1490	2.29	34.512	1474	27.582	59.2	2.19	50.8	14.05	85.71	1.01	1483.
1993	1.97	34.587	1969	27.668	52.1	1.83	42.5	16.82	135.02	1.59	1491.
2496	1.74	34.628	2463	27.718	48.1	1.56	37.4	19.33	192.39	2.19	1498.
2999	1.60	34.654	2955	27.750	45.9	1.38	34.2	21.68	258.26	2.69	1506.
3500	1.53	34.672	3445	27.769	45.0	1.26	32.0	23.95	333.43	3.09	1514.
3997	1.52	34.679	3930	27.775	45.8	1.20	31.1	26.20	419.44	3.31	1523.
4096	1.53*	34.680	4027	27.776	46.0	1.19	31.0	26.66	438.28	3.32	1524.
4195	1.53	34.681*	4123	27.776	46.3	1.18	30.8	27.11	457.50		1526.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 19 DATE 16/ 2/71

POSITION 50- 0.0 N, 144-55.0 W GMT 19.4

HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.96	32.742	0	25.917	209.8	4.96	209.5	0.0	0.0	0.0	1468.
10	4.96	32.743	10	25.918	209.8	4.96	209.5	0.21	0.01	7.07	1468.
19	4.96	32.743	19	25.918	209.8	4.96	209.5	0.40	0.04	7.10	1468.
29	4.97	32.742	29	25.916	210.1	4.97	209.6	0.61	0.09	7.09	1468.
48	4.96	32.739	48	25.914	210.4	4.96	209.7	1.01	0.25	7.04	1469.
72	4.95	32.740	72	25.916	210.4	4.94	209.5	1.52	0.56	7.14	1469.
97	4.97	32.742	96	25.916	210.7	4.96	209.5	2.04	1.01	7.05	1469.
121	4.70	33.082	120	26.214	182.6	4.69	181.2	2.52	1.54	5.84	1469.
145	4.25	33.665	144	26.724	134.3	4.24	132.8	2.90	2.05	3.56	1468.
170	4.08	33.734	169	26.797	127.6	4.07	125.9	3.22	2.57	2.95	1468.
194	3.92	33.786	193	26.854	122.3	3.91	120.4	3.52	3.13	2.45	1468.
244	3.87	33.856	242	26.915	117.0	3.85	114.6	4.11	4.45	1.56	1469.
293	3.78	33.934	291	26.986	110.6	3.76	107.9	4.68	5.99	1.28	1469.
394	3.66	34.043	391	27.084	102.0	3.63	98.5	5.74	9.73	0.95	1471.
498	3.56	34.129	494	27.163	95.4	3.53	91.0	6.77	14.39	0.72	1472.
605	3.38	34.203	600	27.239	88.8	3.34	83.7	7.75	19.93	0.74	1473.





RESULTS OF STD CASTS

(P-71-1)

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 1 DATE 9/ 1/71

POSITION 48-33.0N, 125-33.0W GMT 1.7

RESULTS OF STP CAST 29 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.75	31.57	0	24.50	344.4	0.0	0.0	1481.
10	9.08	31.91	10	24.71	324.3	0.34	0.02	1483.
20	9.39	32.24	20	24.92	304.4	0.65	0.07	1485.
30	9.58	32.34	30	24.97	300.4	0.96	0.14	1486.
50	9.52	32.47	50	25.08	290.1	1.55	0.38	1486.
75	9.18	32.63	75	25.26	273.1	2.25	0.83	1486.
100	8.96	32.77	99	25.41	259.9	2.92	1.42	1485.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	8.75	31.57	39.	9.50	32.39
6.	8.73	31.57	43.	9.53	32.46
8.	8.88	31.80	49.	9.51	32.47
10.	9.08	31.91	52.	9.54	32.47
15.	9.12	31.99	62.	9.33	32.55
17.	9.16	32.12	69.	9.26	32.58
18.	9.23	32.19	72.	9.18	32.61
19.	9.36	32.24	74.	9.18	32.63
22.	9.46	32.25	83.	9.14	32.67
23.	9.47	32.29	85.	9.09	32.71
25.	9.53	32.32	95.	9.06	32.73
28.	9.57	32.33	103.	8.90	32.80
33.	9.59	32.35	105.	8.88	32.83
35.	9.57	32.37	110.	8.88	32.85
38.	9.56	32.38			

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 2

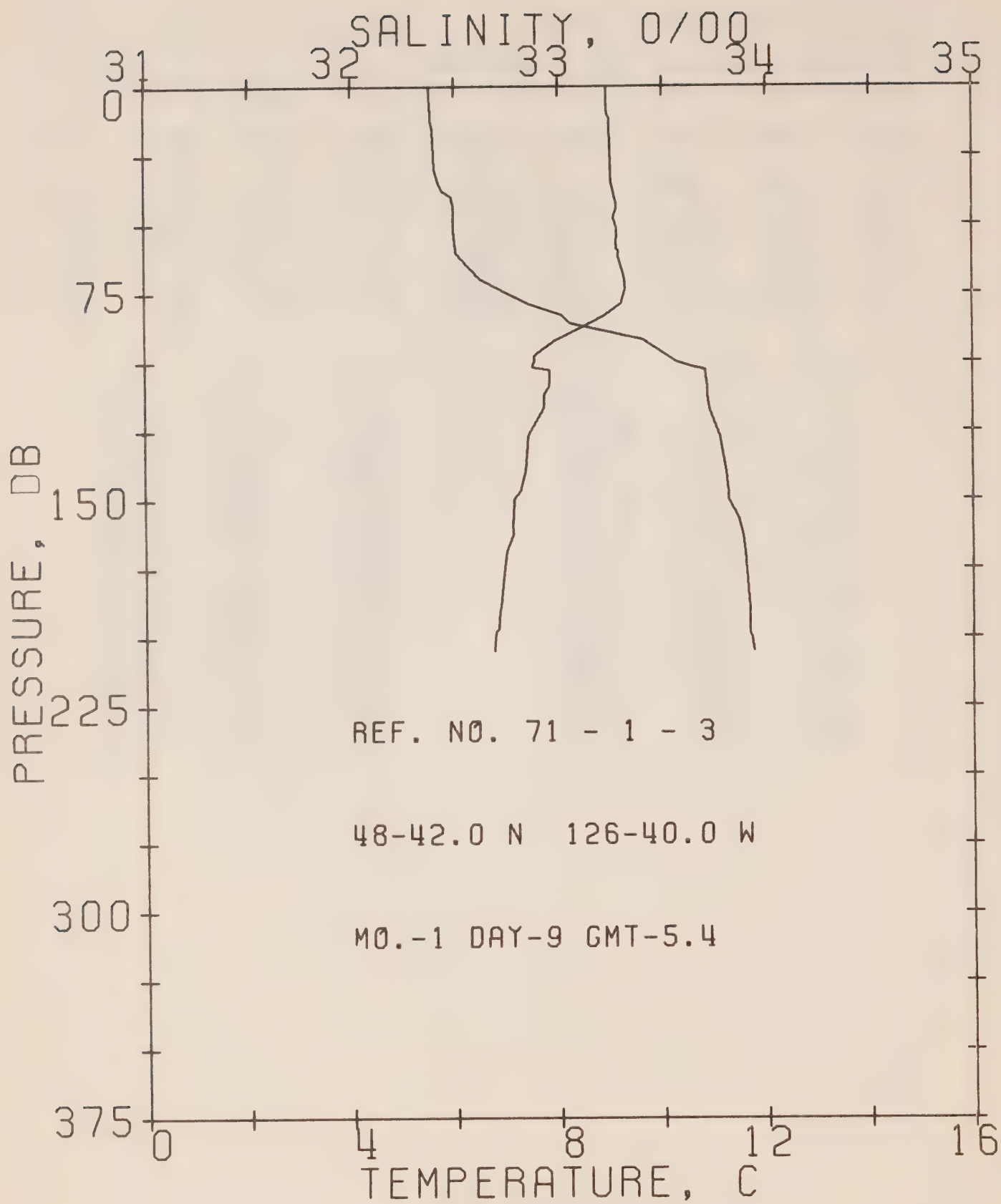
DATE 9/ 1/71

POSITION 48-38.0N, 126- 0.0W GMT 3.3

RESULTS OF STP CAST 30 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.14	30.80	0	23.99	393.3	0.0	0.0	1478.
10	8.33	31.56	10	24.55	339.6	0.38	0.02	1480.
20	9.23	31.92	20	24.70	325.9	0.71	0.07	1484.
30	9.28	32.02	30	24.77	319.1	1.03	0.15	1484.
50	9.01	32.14	50	24.90	307.0	1.66	0.41	1484.
75	9.46	32.37	75	25.01	297.1	2.41	0.89	1486.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	8.14	30.80	57.	9.11	32.21
5.	8.14	30.81	58.	9.13	32.21
10.	8.33	31.56	62.	9.12	32.23
12.	8.54	31.56	65.	9.38	32.31
13.	8.68	31.85	69.	9.36	32.32
15.	9.18	31.90	70.	9.38	32.32
17.	9.21	31.91	73.	9.39	32.35
18.	9.15	31.91	75.	9.46	32.37
20.	9.23	31.92	82.	9.45	32.37
25.	9.28	31.95	84.	9.33	32.37
33.	9.28	32.07	89.	9.25	32.49
37.	9.28	32.08	90.	9.18	32.51
43.	9.02	32.08	92.	9.23	32.66
48.	8.96	32.11	96.	9.23	32.71
55.	9.15	32.21	98.	9.14	32.80





PACIFIC OCEANOGRAPHIC GROUP

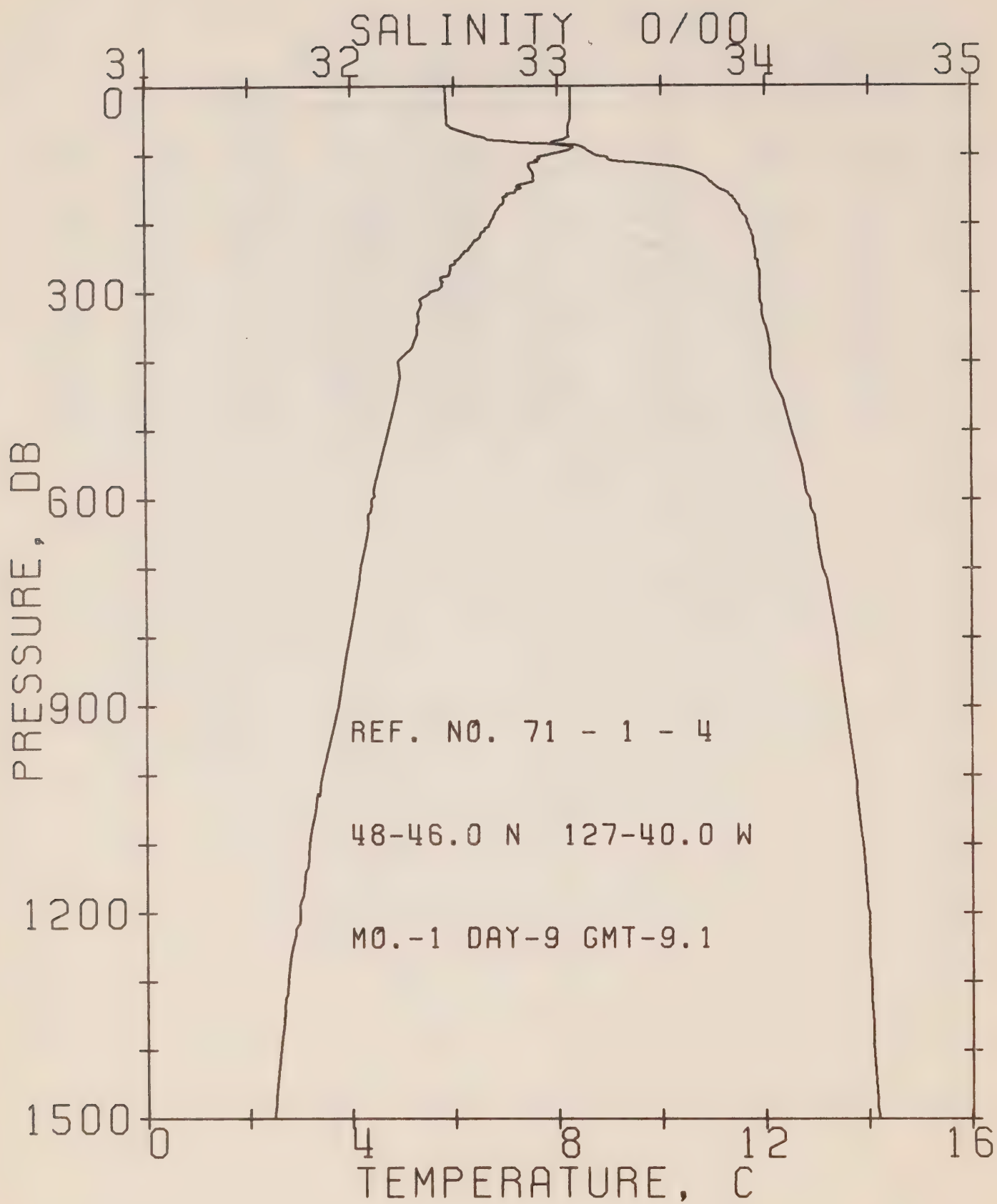
REFERENCE NO. 71- 1- 3

DATE 9/ 1/71

POSITION 48-42.0N, 126-40.0W . GMT 5.4

RESULTS OF STP CAST 43 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.94	32.38	0	25.10	287.0	0.0	0.0	1483.
10	8.94	32.39	10	25.11	286.6	0.29	0.01	1483.
20	9.00	32.40	20	25.11	286.6	0.57	0.06	1484.
30	9.01	32.41	30	25.12	286.4	0.86	0.13	1484.
50	9.09	32.50	50	25.17	281.3	1.43	0.36	1485.
75	9.29	32.76	75	25.34	265.8	2.12	0.80	1486.
100	7.55	33.57	99	26.24	180.5	2.68	1.29	1481.
125	7.49	33.77	124	26.41	165.3	3.11	1.79	1481.
150	7.15	33.82	149	26.49	157.2	3.51	2.35	1481.
175	6.96	33.91	174	26.59	148.7	3.89	2.98	1480.
200	6.76	33.93	199	26.63	144.6	4.26	3.68	1480.



PACIFIC OCEANOGRAPHIC GROUP

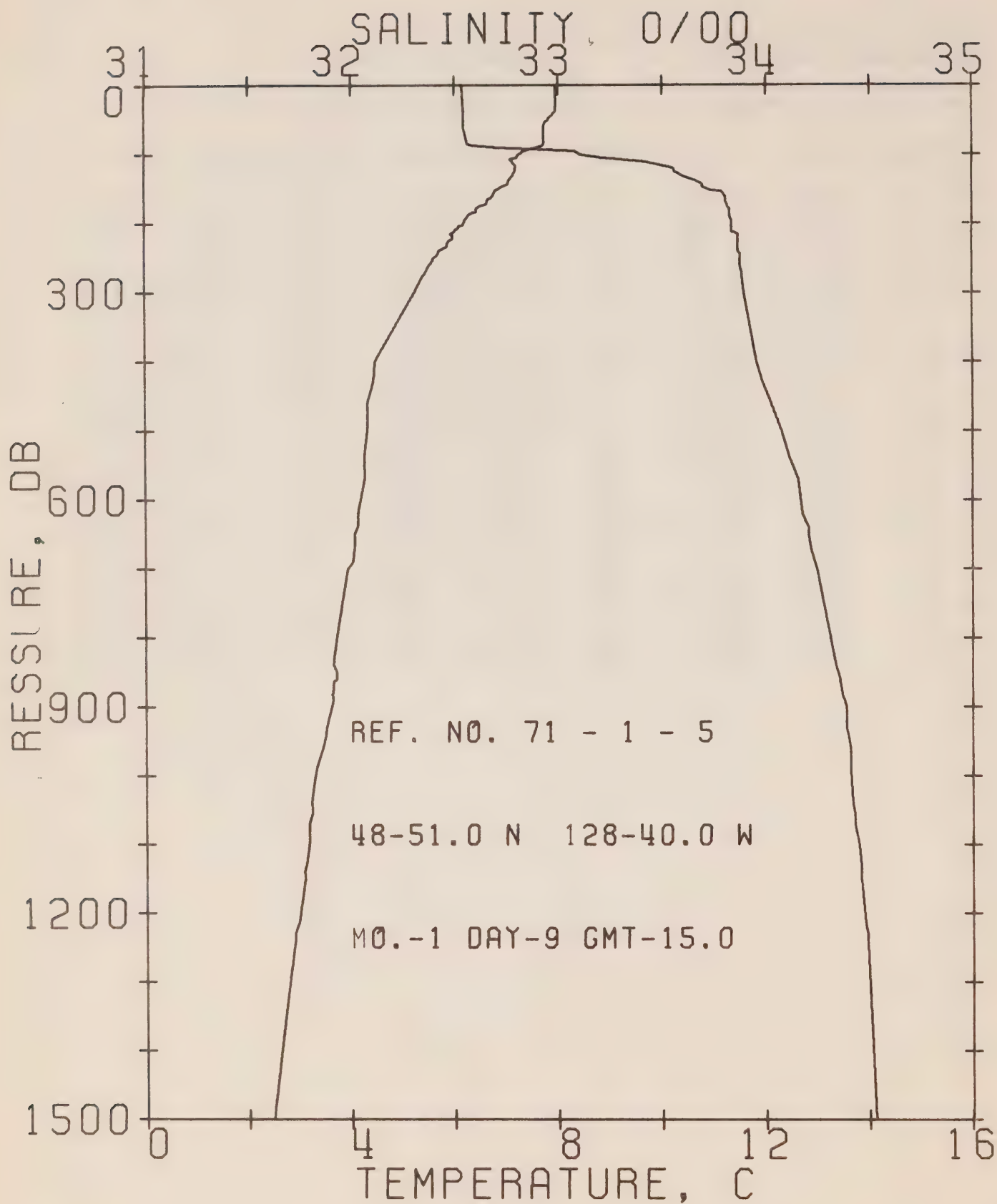
REFERENCE NO. 71- 1- 4

DATE 9/ 1/71

POSITION 48-46.0N, 127-40.0W GMT 9.1

RESULTS OF STP CAST 115 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.28	32.46	0	25.26	271.5	0.0	0.0	1481.
10	8.28	32.46	10	25.27	271.8	0.27	0.01	1481.
20	8.28	32.46	20	25.27	271.7	0.54	0.06	1481.
30	8.28	32.47	30	25.27	271.7	0.82	0.12	1481.
50	8.28	32.47	50	25.27	271.7	1.36	0.35	1482.
75	8.18	32.66	75	25.44	256.6	2.03	0.77	1482.
100	7.83	33.19	99	25.90	212.7	2.60	1.28	1482.
125	7.53	33.67	124	26.32	173.2	3.08	1.83	1481.
150	7.23	33.79	149	26.46	160.6	3.50	2.41	1481.
175	6.91	33.88	174	26.58	149.8	3.88	3.05	1480.
200	6.73	33.92	199	26.63	144.6	4.25	3.75	1480.
225	6.43	33.95	223	26.69	139.2	4.60	4.52	1479.
250	6.13	33.96	248	26.74	135.0	4.95	5.35	1478.
300	5.56	33.98	298	26.83	127.1	5.60	7.18	1477.
400	4.92	34.03	397	26.94	116.8	6.82	11.53	1476.
500	4.74	34.13	496	27.04	108.3	7.96	16.72	1477.
600	4.40	34.22	595	27.15	98.6	8.99	22.52	1477.
800	3.97	34.35	793	27.30	85.8	10.84	35.66	1479.
1000	3.43	34.44	991	27.42	74.9	12.45	50.41	1480.
1200	2.99	34.50	1188	27.51	66.4	13.87	66.21	1482.
1500	2.45	34.55	1484	27.60	58.3	15.74	91.96	1484.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 5

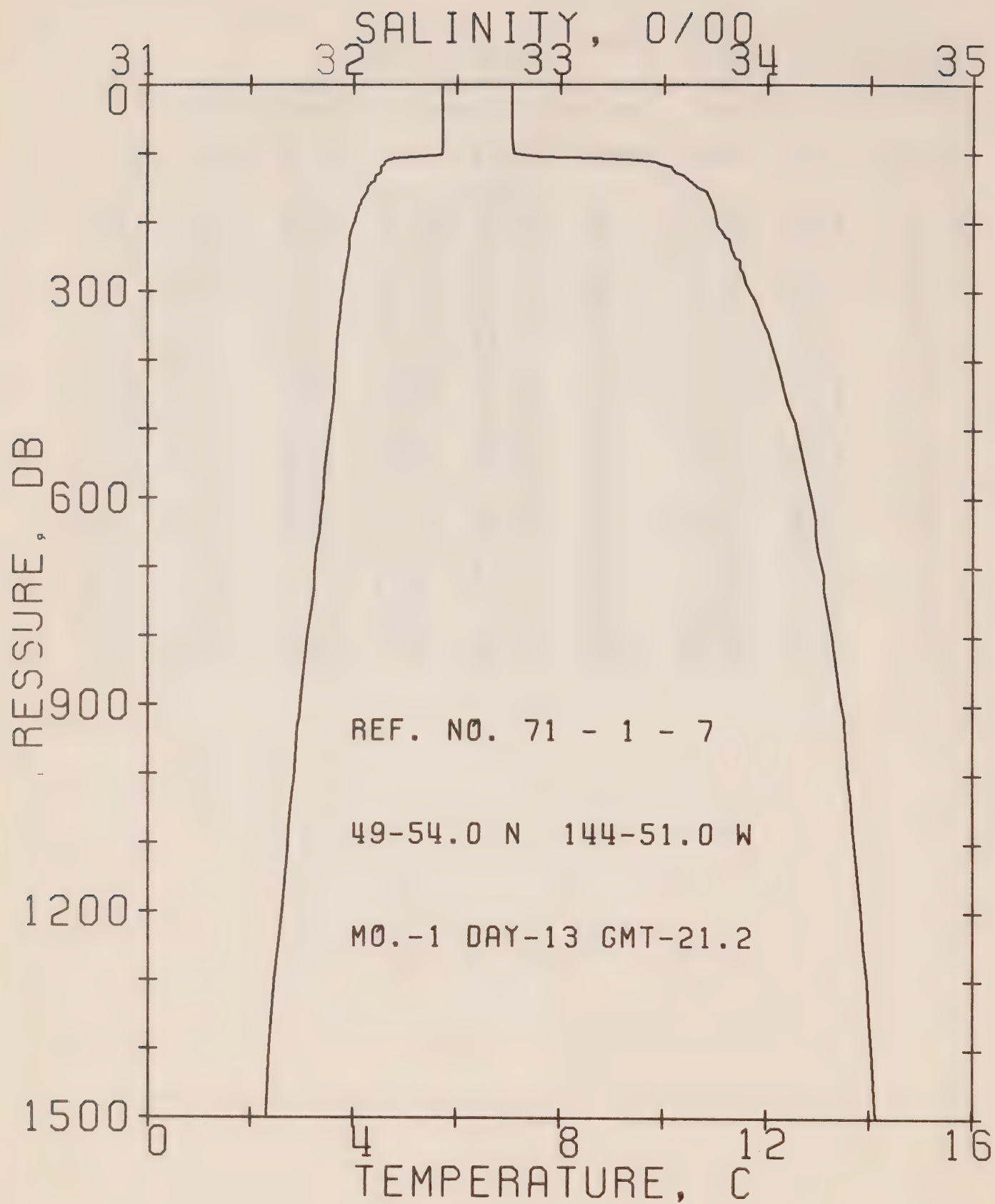
DATE 9/ 1/71

POSITION 48-51.0N, 128-40.0W GMT 15.0

RESULTS OF STP CAST 92 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.97	32.54	0	25.37	261.2	0.0	0.0	1480.
10	7.97	32.54	10	25.37	261.4	0.26	0.01	1480.
20	7.98	32.55	20	25.38	261.4	0.52	0.05	1480.
30	7.98	32.55	30	25.38	261.4	0.78	0.12	1480.
50	7.84	32.55	50	25.40	259.6	1.31	0.33	1480.
75	7.74	32.56	75	25.42	257.8	1.95	0.74	1480.
100	7.28	33.11	99	25.92	211.1	2.56	1.28	1479.
125	7.20	33.57	124	26.29	176.2	3.03	1.82	1480.
150	6.87	33.72	149	26.46	160.8	3.45	2.41	1479.
175	6.51	33.82	174	26.58	149.1	3.83	3.04	1478.
200	6.21	33.84	199	26.63	144.3	4.20	3.74	1478.
225	5.93	33.87	223	26.69	138.9	4.55	4.50	1477.
250	5.62	33.88	248	26.74	134.7	4.89	5.33	1476.
300	5.26	33.90	298	26.80	129.4	5.55	7.18	1476.
400	4.48	33.96	397	26.93	117.0	6.78	11.55	1474.
500	4.33	34.08	496	27.05	107.3	7.91	16.68	1475.
600	4.20	34.17	595	27.13	99.9	8.94	22.47	1476.
800	3.73	34.31	793	27.29	85.7	10.79	35.64	1478.
1000	3.30	34.41	991	27.41	75.1	12.40	50.31	1479.
1200	3.00	34.48	1188	27.49	68.4	13.83	66.36	1482.
1500	2.46	34.53	1484	27.58	59.8	15.74	92.52	1484.





PACIFIC OCEANOGRAPHIC GROUP

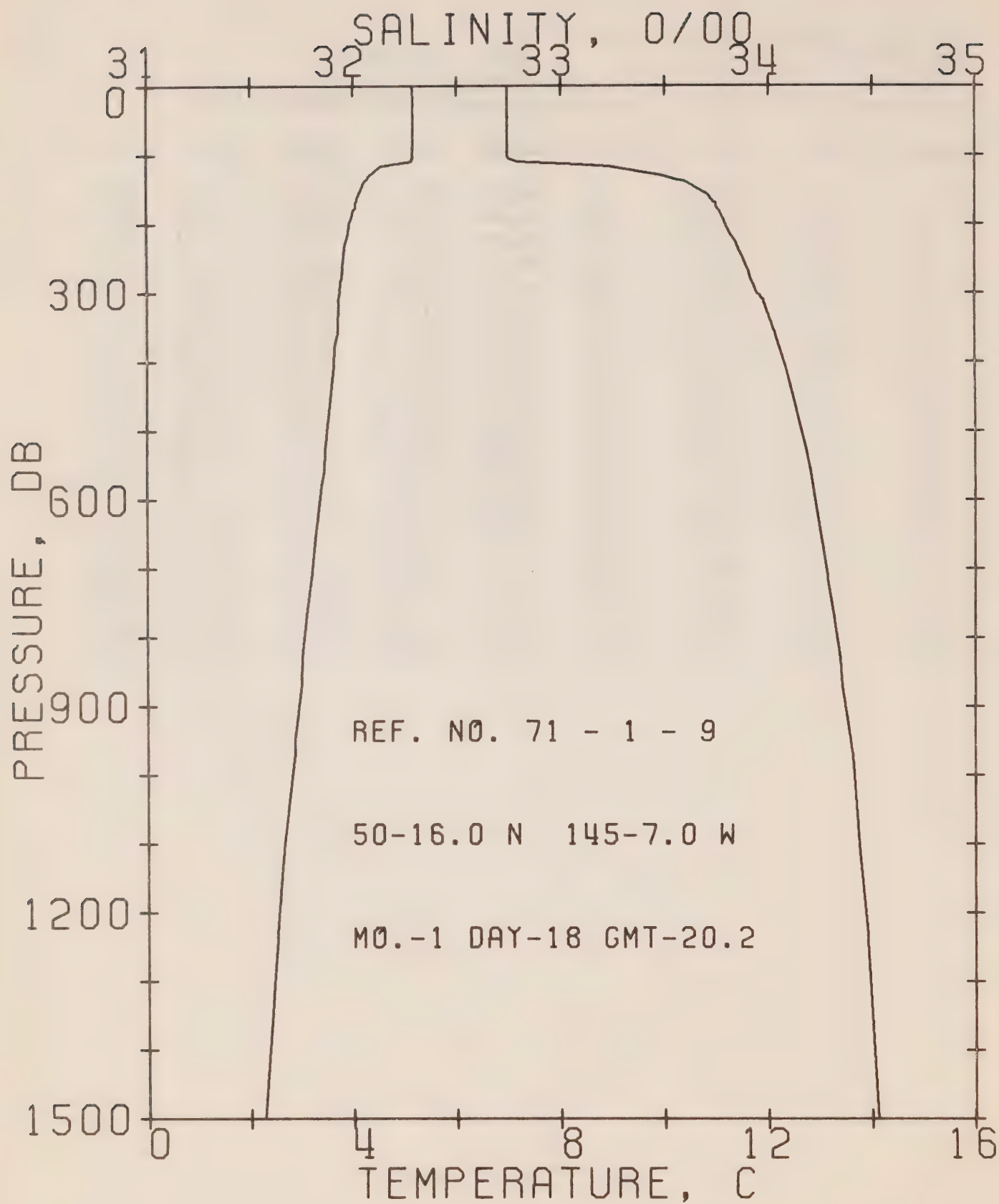
REFERENCE NO. 71- 1- 7

DATE 13/ 1/71

POSITION 49-54.0N, 144-51.0W GMT 21.2

RESULTS OF STP CAST 64 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.73	32.77	0	25.85	215.9	0.0	0.0	1471.
10	5.73	32.77	10	25.85	216.2	0.22	0.01	1471.
20	5.73	32.77	20	25.85	216.3	0.43	0.04	1471.
30	5.73	32.77	30	25.85	216.4	0.65	0.10	1472.
50	5.73	32.77	50	25.85	216.6	1.08	0.28	1472.
75	5.74	32.77	75	25.85	217.0	1.62	0.62	1472.
100	5.74	32.78	99	25.86	216.5	2.17	1.10	1473.
125	4.54	33.55	124	26.60	145.6	2.58	1.58	1469.
150	4.30	33.67	149	26.72	134.5	2.93	2.07	1469.
175	4.14	33.74	174	26.80	127.9	3.26	2.61	1469.
200	4.04	33.76	199	26.82	125.5	3.57	3.21	1469.
225	3.94	33.82	223	26.88	120.3	3.88	3.88	1469.
250	3.91	33.85	248	26.90	118.1	4.18	4.60	1469.
300	3.81	33.92	298	26.97	112.0	4.76	6.21	1469.
400	3.68	34.05	397	27.09	101.8	5.82	9.99	1471.
500	3.56	34.15	496	27.18	94.1	6.80	14.48	1472.
600	3.43	34.22	595	27.25	87.9	7.71	19.57	1473.
800	3.12	34.32	793	27.36	78.6	9.38	31.44	1475.
1000	2.86	34.40	990	27.44	71.3	10.87	45.07	1478.
1200	2.62	34.46	1188	27.51	65.2	12.23	60.36	1480.
1500	2.29	34.53	1483	27.60	58.0	14.06	85.53	1484.



PACIFIC OCEANOGRAPHIC GROUP

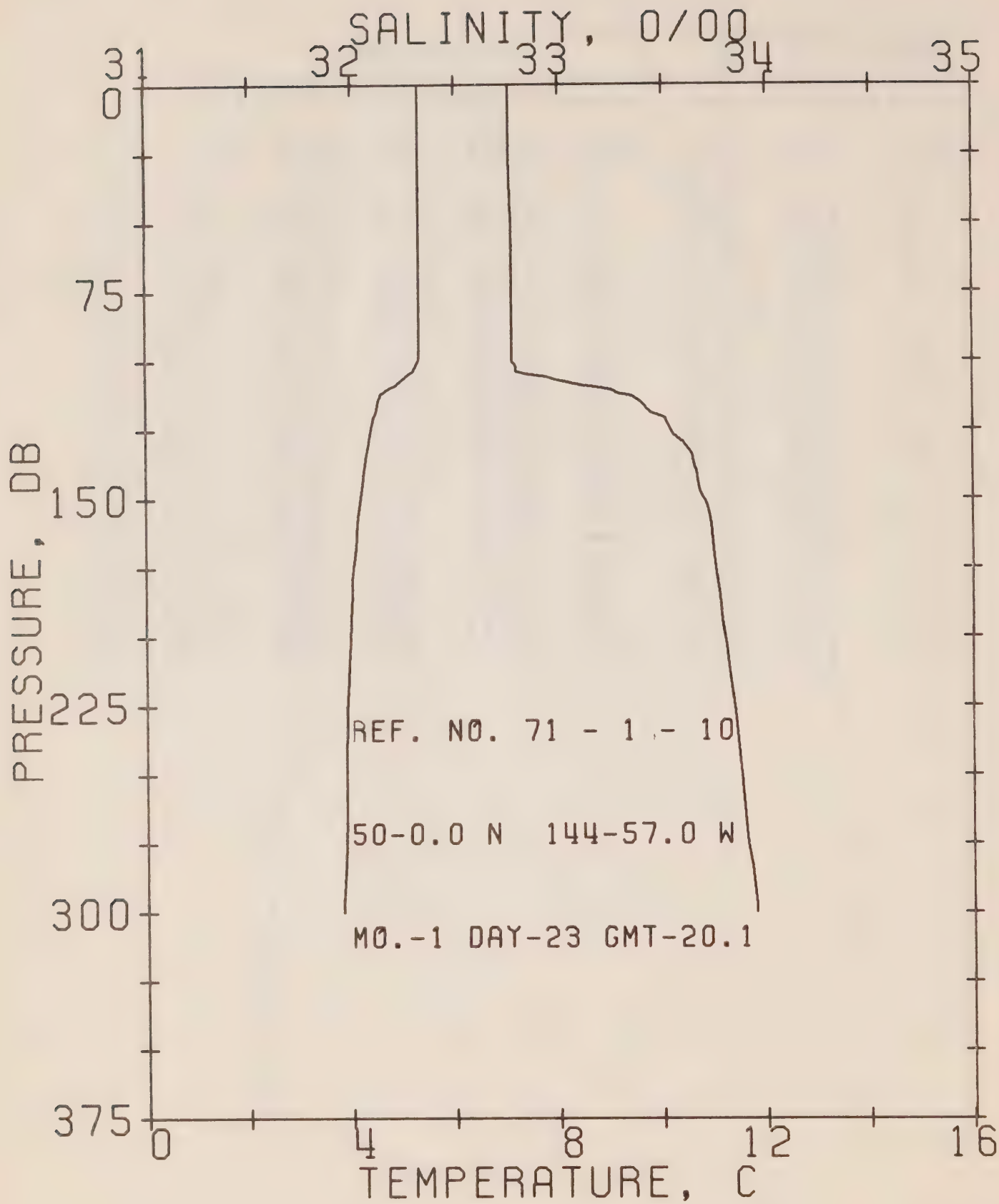
REFERENCE NO. 71- 1- 9

DATE 18/ 1/71

POSITION 50-16.0N, 145- 7.0W GMT 20.2

RESULTS OF STP CAST 55 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.16	32.75	0	25.90	211.1	0.0	0.0	1469.
10	5.17	32.75	10	25.90	211.5	0.21	0.01	1469.
20	5.18	32.75	20	25.90	211.7	0.42	0.04	1469.
30	5.18	32.75	30	25.90	211.8	0.63	0.10	1469.
50	5.18	32.75	50	25.90	212.0	1.06	0.27	1470.
75	5.18	32.75	75	25.90	212.2	1.59	0.61	1470.
100	5.19	32.75	99	25.90	212.5	2.12	1.08	1470.
125	4.43	33.39	124	26.49	156.5	2.59	1.62	1469.
150	4.19	33.67	149	26.73	133.4	2.95	2.12	1468.
175	4.06	33.76	174	26.82	125.8	3.27	2.65	1468.
200	3.95	33.80	199	26.86	121.8	3.58	3.24	1468.
225	3.89	33.85	223	26.90	117.8	3.88	3.89	1468.
250	3.84	33.88	248	26.94	114.5	4.17	4.59	1469.
300	3.76	33.95	298	27.00	109.2	4.73	6.16	1469.
400	3.65	34.08	397	27.12	99.0	5.76	9.84	1471.
500	3.51	34.17	496	27.20	92.1	6.72	14.20	1472.
600	3.37	34.23	595	27.26	86.5	7.61	19.20	1473.
800	3.06	34.34	793	27.37	76.9	9.24	30.80	1475.
1000	2.82	34.42	990	27.46	69.5	10.70	44.19	1477.
1200	2.55	34.47	1188	27.53	63.7	12.04	59.11	1480.
1500	2.26	34.53	1483	27.60	57.6	13.86	84.08	1483.





PACIFIC OCEANOGRAPHIC GROUP

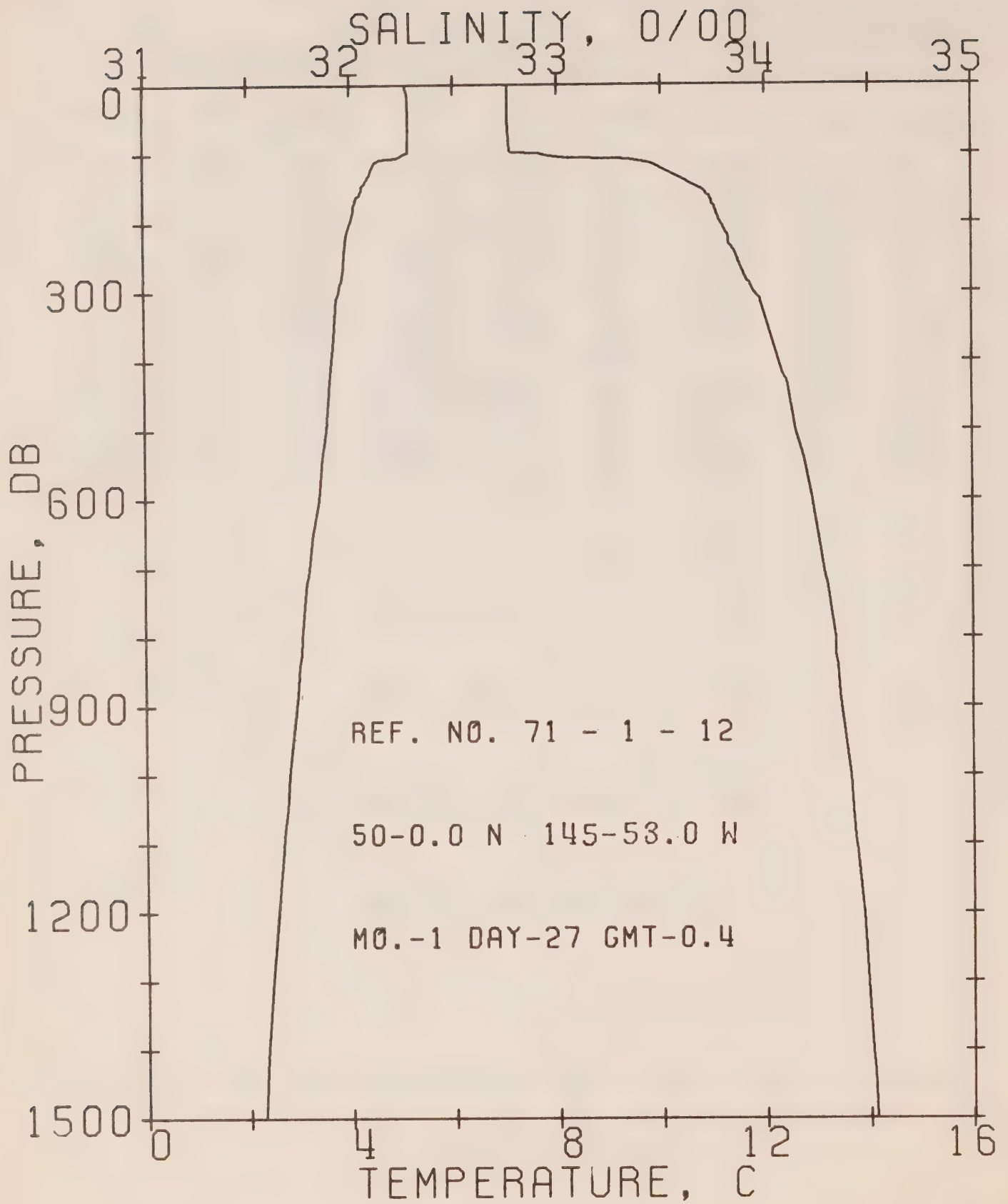
REFERENCE NO. 71- 1- 10

DATE 23/ 1/71

POSITION 50- 0.0N, 144-57.0W GMT 20.1

RESULTS OF STP CAST 43 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.33	32.77	0	25.90	211.4	0.0	0.0	1469.
10	5.33	32.77	10	25.90	211.7	0.21	0.01	1470.
20	5.33	32.77	20	25.90	211.8	0.42	0.04	1470.
30	5.33	32.77	30	25.90	211.8	0.64	0.10	1470.
50	5.33	32.78	50	25.91	211.3	1.06	0.27	1470.
75	5.33	32.78	75	25.91	211.6	1.59	0.61	1471.
100	5.33	32.78	99	25.91	211.8	2.12	1.08	1471.
125	4.40	33.55	124	26.61	144.6	2.55	1.57	1469.
150	4.18	33.70	149	26.76	130.7	2.89	2.05	1468.
175	4.04	33.76	174	26.82	125.3	3.21	2.57	1468.
200	3.98	33.80	199	26.86	121.6	3.51	3.16	1468.
225	3.91	33.85	223	26.90	117.9	3.81	3.81	1469.
250	3.88	33.88	248	26.93	115.3	4.11	4.52	1469.
300	3.80	33.95	298	27.00	109.7	4.67	6.09	1469.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 12

DATE 27/ 1/71

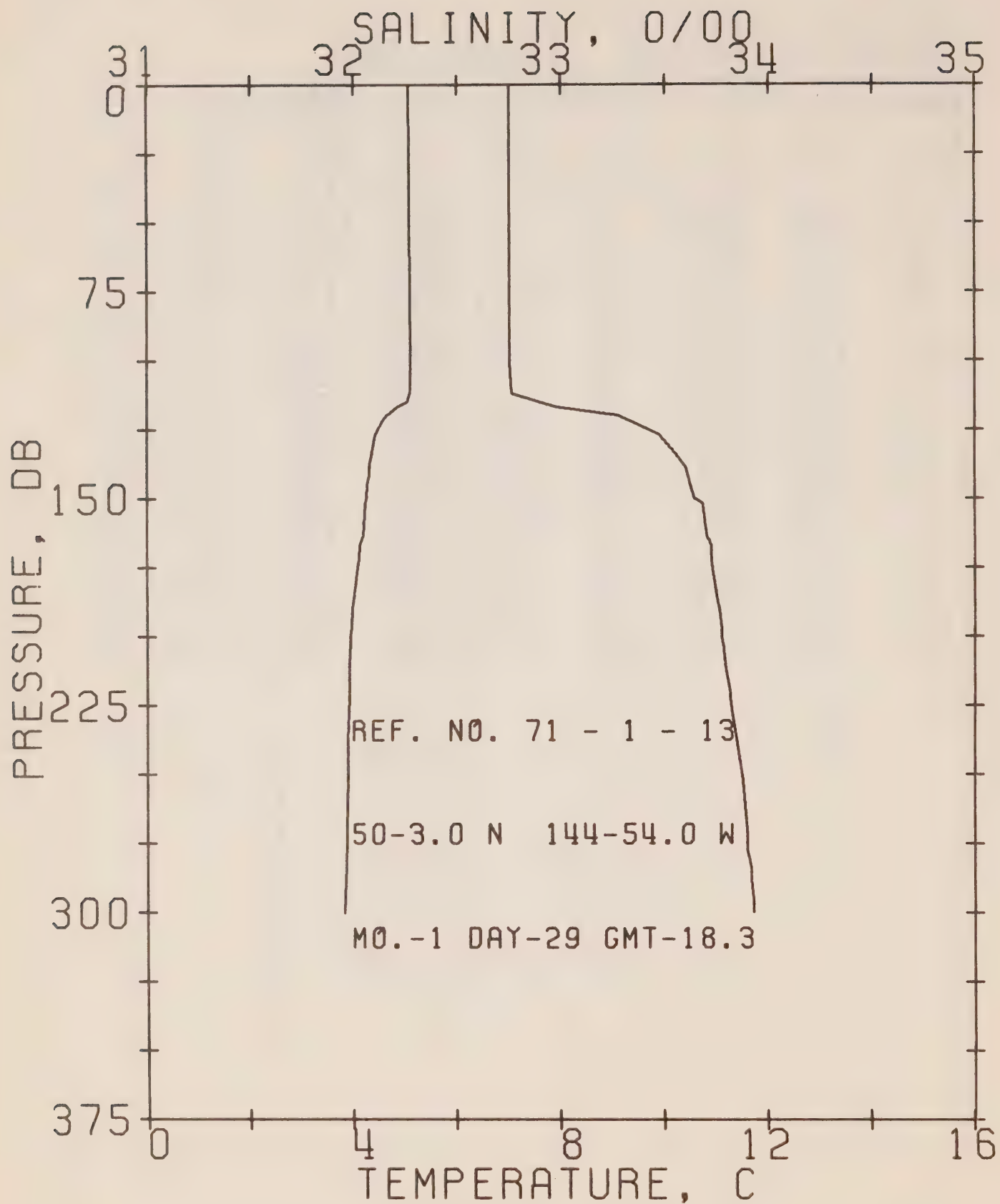
POSITION 50- 0.0N, 144-53.0W

GMT 0.4

RESULTS OF STP CAST

64 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.10	32.77	0	25.92	208.9	0.0	0.0	1468.
10	5.12	32.77	10	25.92	209.5	0.21	0.01	1469.
20	5.15	32.77	20	25.92	209.9	0.42	0.04	1469.
30	5.15	32.77	30	25.92	210.0	0.63	0.10	1469.
50	5.16	32.77	50	25.92	210.2	1.05	0.27	1470.
75	5.16	32.78	75	25.92	210.0	1.57	0.60	1470.
100	5.08	32.93	99	26.05	197.9	2.10	1.07	1470.
125	4.44	33.53	124	26.60	146.0	2.51	1.53	1469.
150	4.25	33.69	149	26.74	132.6	2.85	2.02	1469.
175	4.10	33.76	174	26.82	126.0	3.17	2.55	1468.
200	4.03	33.79	199	26.85	123.0	3.49	3.15	1469.
225	3.94	33.83	223	26.89	119.5	3.79	3.80	1469.
250	3.90	33.87	248	26.92	116.3	4.08	4.52	1469.
300	3.80	33.95	298	27.00	109.7	4.65	6.10	1469.
400	3.65	34.07	397	27.11	99.9	5.69	9.80	1471.
500	3.55	34.15	496	27.18	93.7	6.65	14.20	1472.
600	3.40	34.23	595	27.26	86.9	7.55	19.24	1473.
800	3.05	34.34	793	27.38	76.4	9.18	30.80	1475.
1000	2.79	34.41	990	27.46	69.7	10.65	44.26	1477.
1200	2.56	34.47	1188	27.53	63.9	11.99	59.26	1480.
1500	2.27	34.53	1483	27.60	57.7	13.81	84.20	1483.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 13

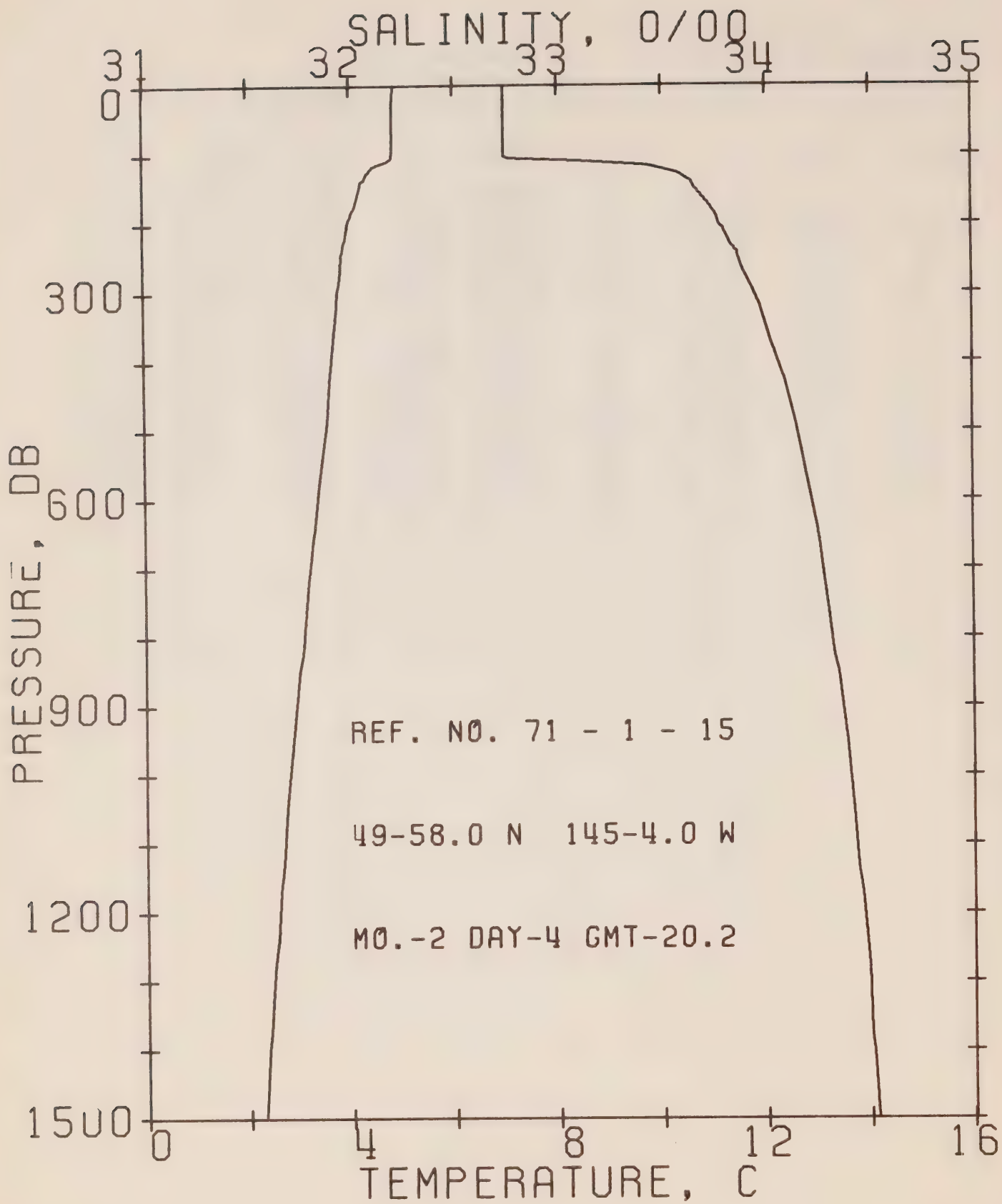
DATE 29/ 1/71

POSITION 50- 3.0N, 144-54.0W GMT 18.3

RESULTS OF STP CAST 41 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.10	32.76	0	25.92	209.6	0.0	0.0	1468.
10	5.10	32.76	10	25.92	210.0	0.21	0.01	1469.
20	5.11	32.76	20	25.91	210.1	0.42	0.04	1469.
30	5.11	32.76	30	25.91	210.2	0.63	0.10	1469.
50	5.11	32.76	50	25.91	210.4	1.05	0.27	1469.
75	5.12	32.76	75	25.91	210.8	1.58	0.60	1470.
100	5.13	32.76	99	25.91	211.2	2.10	1.07	1470.
125	4.52	33.42	124	26.51	155.0	2.59	1.63	1469.
150	4.28	33.65	149	26.71	135.8	2.95	2.13	1469.
175	4.11	33.74	174	26.80	127.9	3.27	2.67	1468.
200	3.96	33.78	199	26.85	123.2	3.59	3.27	1468.
225	3.93	33.82	223	26.88	119.7	3.89	3.92	1469.
250	3.89	33.88	248	26.93	115.8	4.19	4.63	1469.
300	3.81	33.93	298	26.98	111.2	4.75	6.22	1470.





PACIFIC OCEANOGRAPHIC GROUP

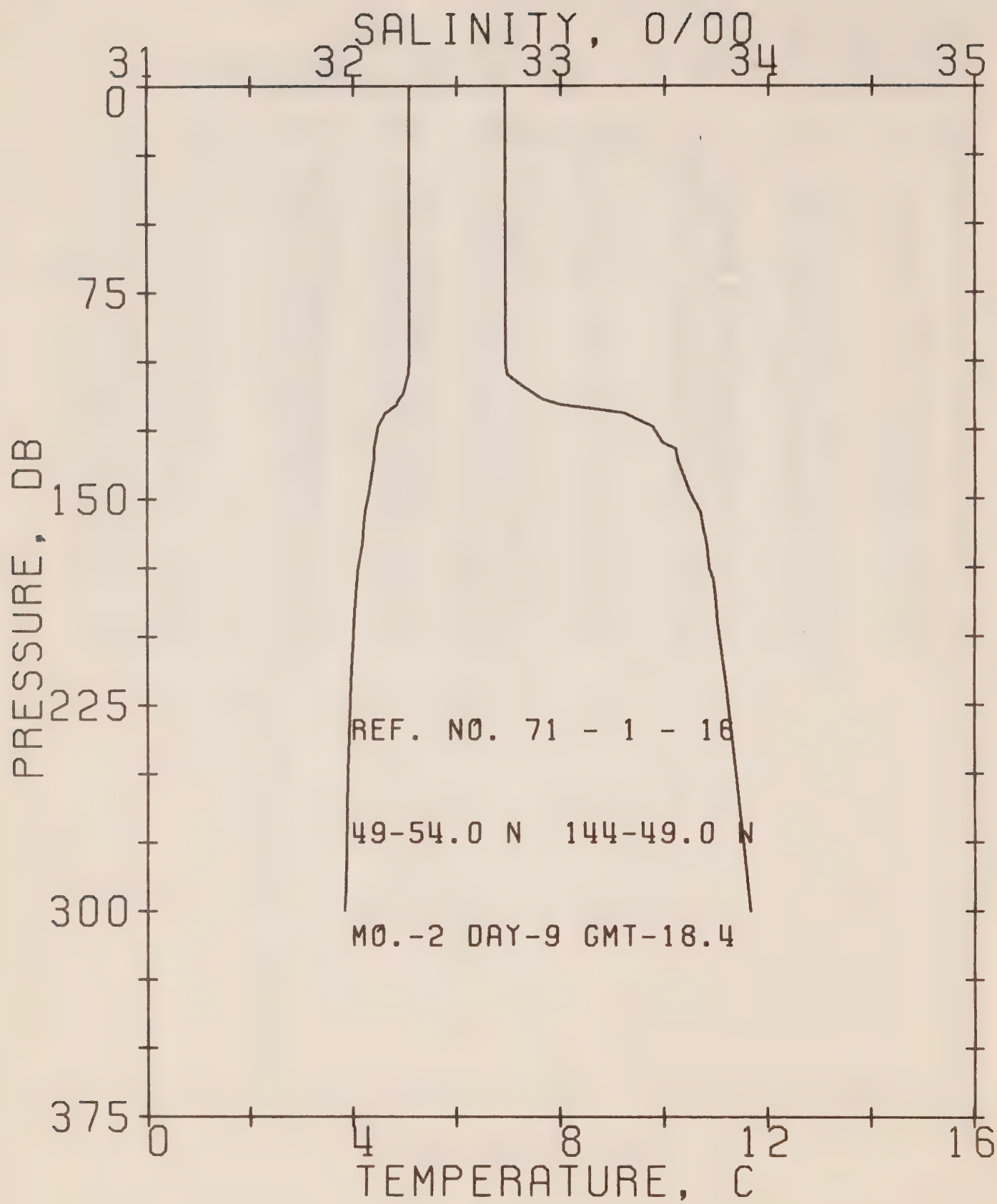
REFERENCE NO. 71- 1- 15

DATE 4/ 2/71

POSITION 49-58.0N, 145- 4.0W GMT 20.2

RESULTS OF STP CAST 51 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.88	32.75	0	25.93	208.1	0.0	0.0	1468.
10	4.87	32.75	10	25.93	208.3	0.21	0.01	1468.
20	4.86	32.75	20	25.93	208.3	0.42	0.04	1468.
30	4.85	32.75	30	25.94	208.2	0.62	0.10	1468.
50	4.85	32.75	50	25.94	208.4	1.04	0.27	1468.
75	4.85	32.75	75	25.94	208.6	1.56	0.60	1469.
100	4.85	32.75	99	25.94	208.8	2.08	1.06	1469.
125	4.40	33.55	124	26.62	144.3	2.52	1.56	1469.
150	4.23	33.67	149	26.73	133.8	2.87	2.04	1468.
175	4.13	33.74	174	26.80	127.8	3.19	2.58	1469.
200	3.99	33.78	199	26.85	123.2	3.51	3.18	1468.
225	3.93	33.83	223	26.89	119.3	3.81	3.84	1469.
250	3.86	33.88	248	26.93	115.4	4.10	4.55	1469.
300	3.78	33.95	298	27.00	109.4	4.67	6.12	1469.
400	3.65	34.06	397	27.10	100.4	5.71	9.85	1471.
500	3.54	34.16	496	27.19	93.1	6.68	14.26	1472.
600	3.37	34.22	595	27.26	87.1	7.58	19.30	1473.
800	3.09	34.32	793	27.36	78.3	9.22	31.02	1475.
1000	2.80	34.40	990	27.45	70.1	10.70	44.52	1477.
1200	2.57	34.47	1188	27.52	64.1	12.05	59.58	1480.
1500	2.27	34.53	1483	27.60	57.7	13.87	84.60	1483.



PACIFIC OCEANOGRAPHIC GROUP

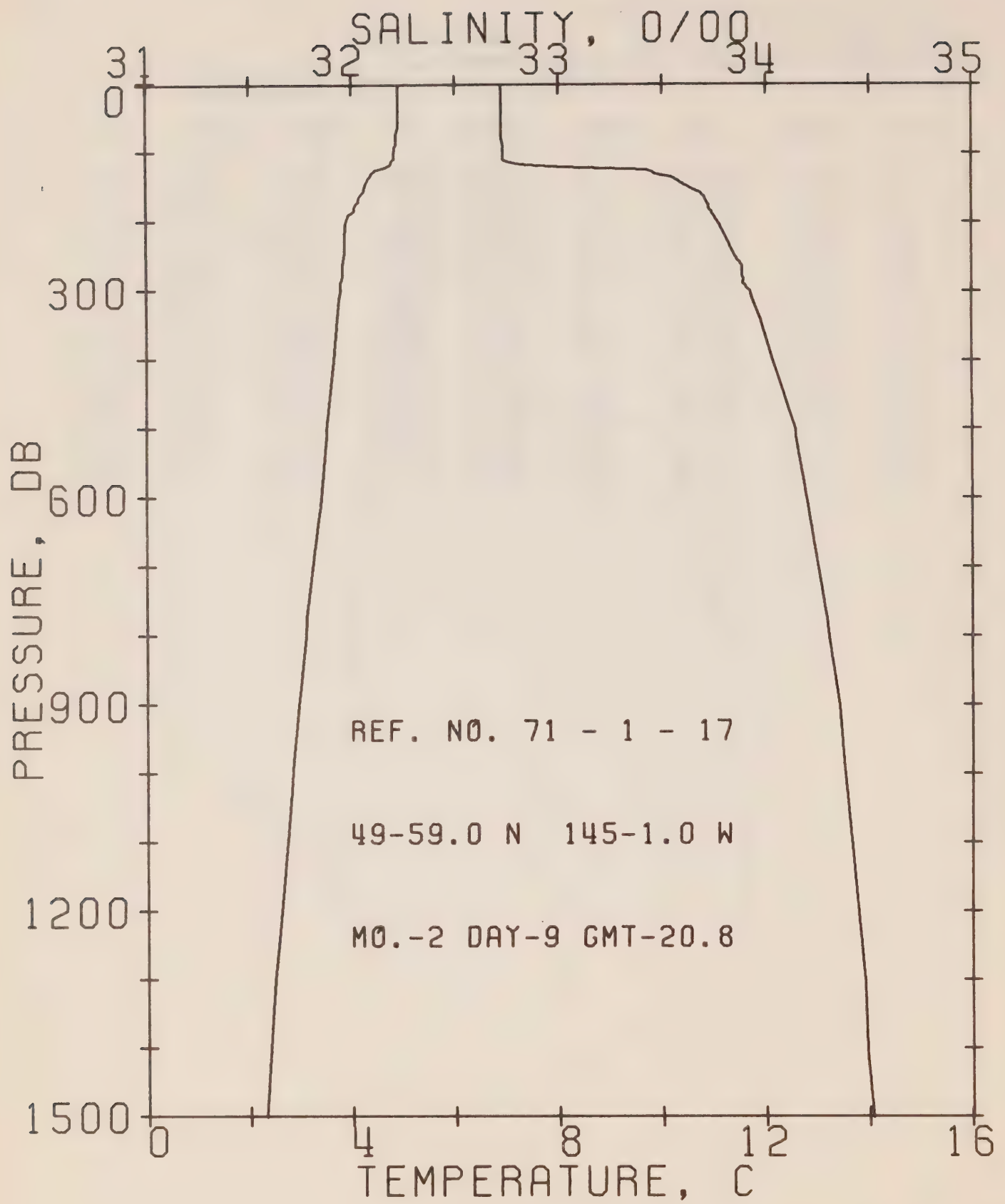
REFERENCE NO. 71- 1- 16

DATE 9/ 2/71

POSITION 49-54.0N, 144-49.0W GMT 18.4

RESULTS OF STP CAST 30 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.11	32.74	0	25.90	211.3	0.0	0.0	1468.
10	5.11	32.74	10	25.90	211.6	0.21	0.01	1469.
20	5.11	32.74	20	25.90	211.7	0.42	0.04	1469.
30	5.11	32.74	30	25.90	211.8	0.63	0.10	1469.
50	5.11	32.74	50	25.90	211.9	1.06	0.27	1469.
75	5.11	32.74	75	25.90	212.2	1.59	0.61	1470.
100	5.11	32.74	99	25.90	212.4	2.12	1.08	1470.
125	4.49	33.46	124	26.53	152.2	2.60	1.62	1469.
150	4.31	33.64	149	26.70	136.6	2.95	2.12	1469.
175	4.12	33.72	174	26.78	129.1	3.28	2.67	1468.
200	4.01	33.77	199	26.83	124.5	3.60	3.27	1469.
225	3.95	33.81	223	26.87	120.9	3.91	3.94	1469.
250	3.90	33.85	248	26.91	117.7	4.20	4.66	1469.
300	3.83	33.92	298	26.97	112.2	4.78	6.27	1470.





PACIFIC OCEANOGRAPHIC GROUP

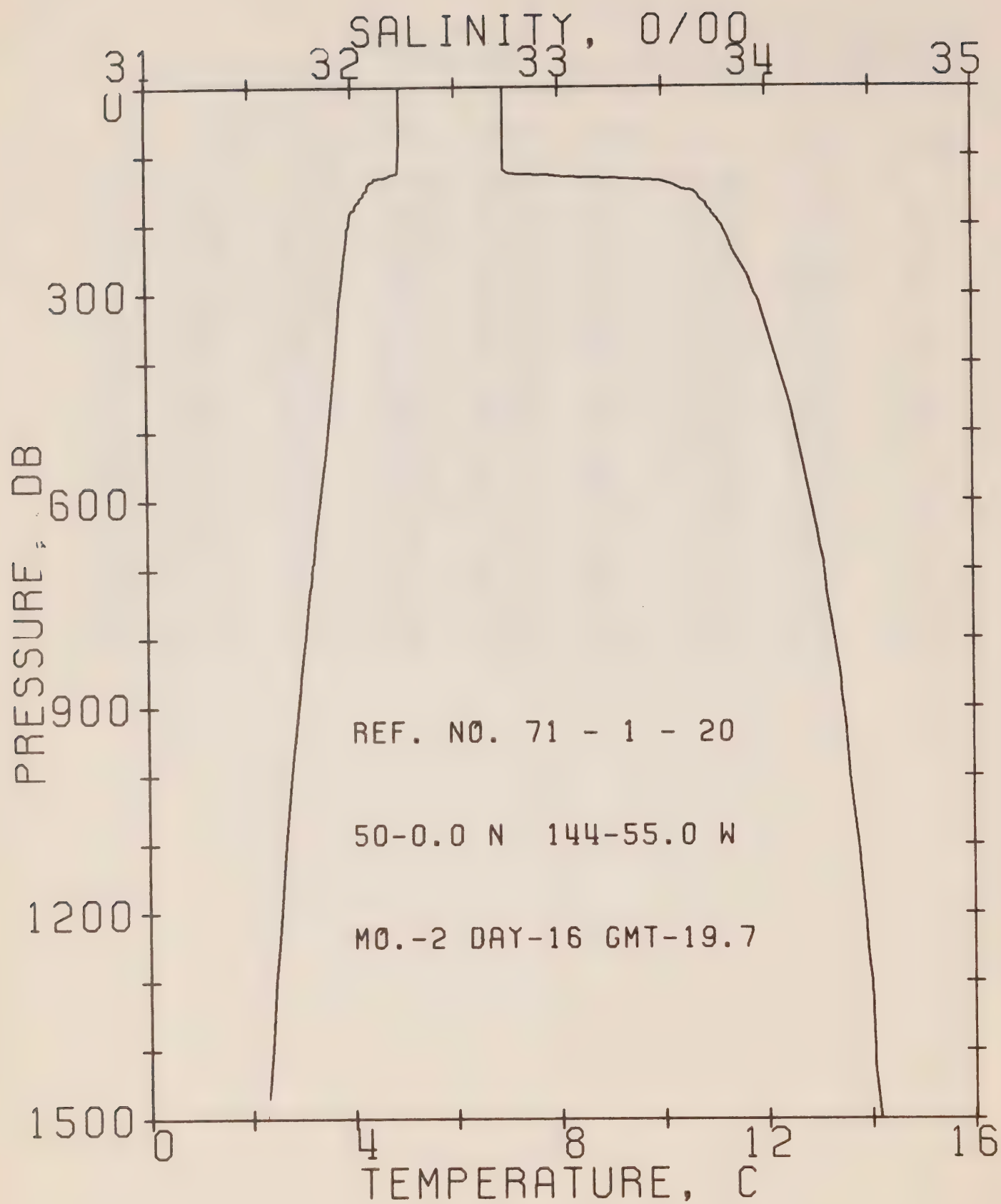
REFERENCE NO. 71- 1- 17

DATE 9/ 2/71

POSITION 49-59.0N, 145- 1.0W GMT 20.8

RESULTS OF STP CAST 53 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.94	32.73	0	25.91	210.2	0.0	0.0	1468.
10	4.93	32.73	10	25.91	210.4	0.21	0.01	1468.
20	4.93	32.73	20	25.91	210.5	0.42	0.04	1468.
30	4.93	32.73	30	25.91	210.6	0.63	0.10	1468.
50	4.93	32.73	50	25.91	210.8	1.05	0.27	1469.
75	4.90	32.73	75	25.92	210.5	1.58	0.60	1469.
100	4.85	32.74	99	25.93	209.6	2.10	1.07	1469.
125	4.47	33.44	124	26.52	153.4	2.60	1.64	1469.
150	4.29	33.64	149	26.70	136.6	2.96	2.14	1469.
175	4.10	33.73	174	26.79	128.2	3.29	2.68	1468.
200	3.92	33.78	199	26.85	123.1	3.60	3.28	1468.
225	3.90	33.82	223	26.88	119.8	3.91	3.94	1469.
250	3.88	33.86	248	26.92	116.8	4.20	4.66	1469.
300	3.81	33.93	298	26.98	111.2	4.77	6.26	1470.
400	3.68	34.04	397	27.08	102.5	5.84	10.05	1471.
500	3.54	34.15	496	27.18	93.6	6.82	14.52	1472.
600	3.43	34.20	595	27.23	89.2	7.74	19.65	1473.
800	3.12	34.31	793	27.35	79.4	9.41	31.58	1475.
1000	2.85	34.39	990	27.43	72.0	10.92	45.34	1478.
1200	2.62	34.45	1188	27.50	66.0	12.30	60.77	1480.
1500	2.31	34.52	1483	27.59	58.9	14.17	86.44	1484.



PACIFIC OCEANOGRAPHIC GROUP

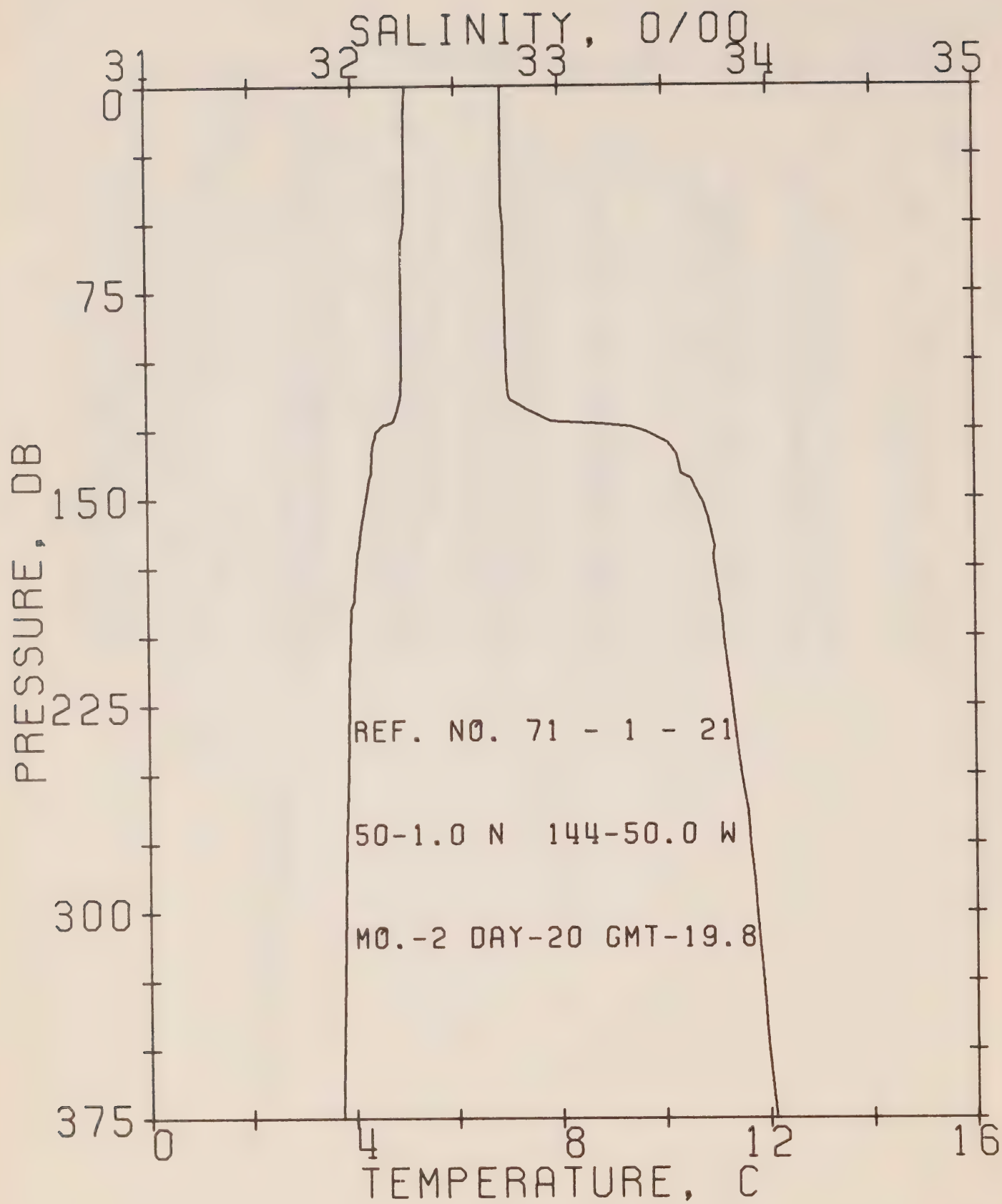
REFERENCE NO. 71- 1- 20

DATE 16/ 2/71

POSITION 50- 0.0N, 144-55.0W GMT 19.7

RESULTS OF STP CAST 59 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.96	32.74	0	25.92	209.6	0.0	0.0	1468.
10	4.96	32.74	10	25.92	210.0	0.21	0.01	1468.
20	4.96	32.74	20	25.92	210.0	0.42	0.04	1468.
30	4.96	32.74	30	25.92	210.1	0.63	0.10	1468.
50	4.96	32.74	50	25.92	210.3	1.05	0.27	1469.
75	4.96	32.74	75	25.92	210.5	1.58	0.60	1469.
100	4.95	32.74	99	25.92	210.7	2.10	1.07	1469.
125	4.93	32.76	124	25.93	209.2	2.63	1.68	1470.
150	4.34	33.61	149	26.67	139.5	3.03	2.24	1469.
175	4.10	33.73	174	26.79	128.5	3.36	2.78	1468.
200	3.99	33.79	199	26.85	122.8	3.68	3.38	1468.
225	3.92	33.83	223	26.89	119.3	3.98	4.04	1469.
250	3.87	33.87	248	26.93	116.0	4.27	4.75	1469.
300	3.80	33.95	298	27.00	109.7	4.83	6.32	1469.
400	3.68	34.06	397	27.10	100.9	5.88	10.06	1471.
500	3.55	34.15	496	27.18	93.8	6.86	14.50	1472.
600	3.39	34.22	595	27.25	87.6	7.76	19.58	1473.
800	3.08	34.33	793	27.37	77.4	9.41	31.27	1475.
1000	2.79	34.40	990	27.45	70.4	10.88	44.74	1477.
1200	2.57	34.47	1188	27.52	63.9	12.22	59.72	1480.
1500	2.26	34.54	1483	27.61	56.9	14.03	84.67	1483.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 1- 21

DATE 20/ 2/71

POSITION 50- 1.0N, 144-50.0W GMT 19.8

RESULTS OF STP CAST 47 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.08	32.73	0	25.89	211.7	0.0	0.0	1468.
10	5.05	32.73	10	25.90	211.7	0.21	0.01	1468.
20	5.05	32.73	20	25.90	211.8	0.42	0.04	1469.
30	5.05	32.73	30	25.90	211.8	0.64	0.10	1469.
50	5.04	32.74	50	25.91	211.2	1.06	0.27	1469.
75	4.98	32.74	75	25.92	210.4	1.59	0.61	1469.
100	4.97	32.75	99	25.92	210.2	2.11	1.07	1470.
125	4.52	33.39	124	26.48	157.6	2.62	1.65	1469.
150	4.27	33.68	149	26.74	133.1	2.97	2.15	1469.
175	4.07	33.75	174	26.81	126.4	3.29	2.68	1468.
200	3.95	33.79	199	26.85	122.4	3.60	3.27	1468.
225	3.91	33.83	223	26.89	119.2	3.91	3.93	1469.
250	3.88	33.87	248	26.92	116.1	4.20	4.64	1469.
300	3.80	33.94	298	26.99	110.4	4.76	6.22	1469.





SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-71-1)

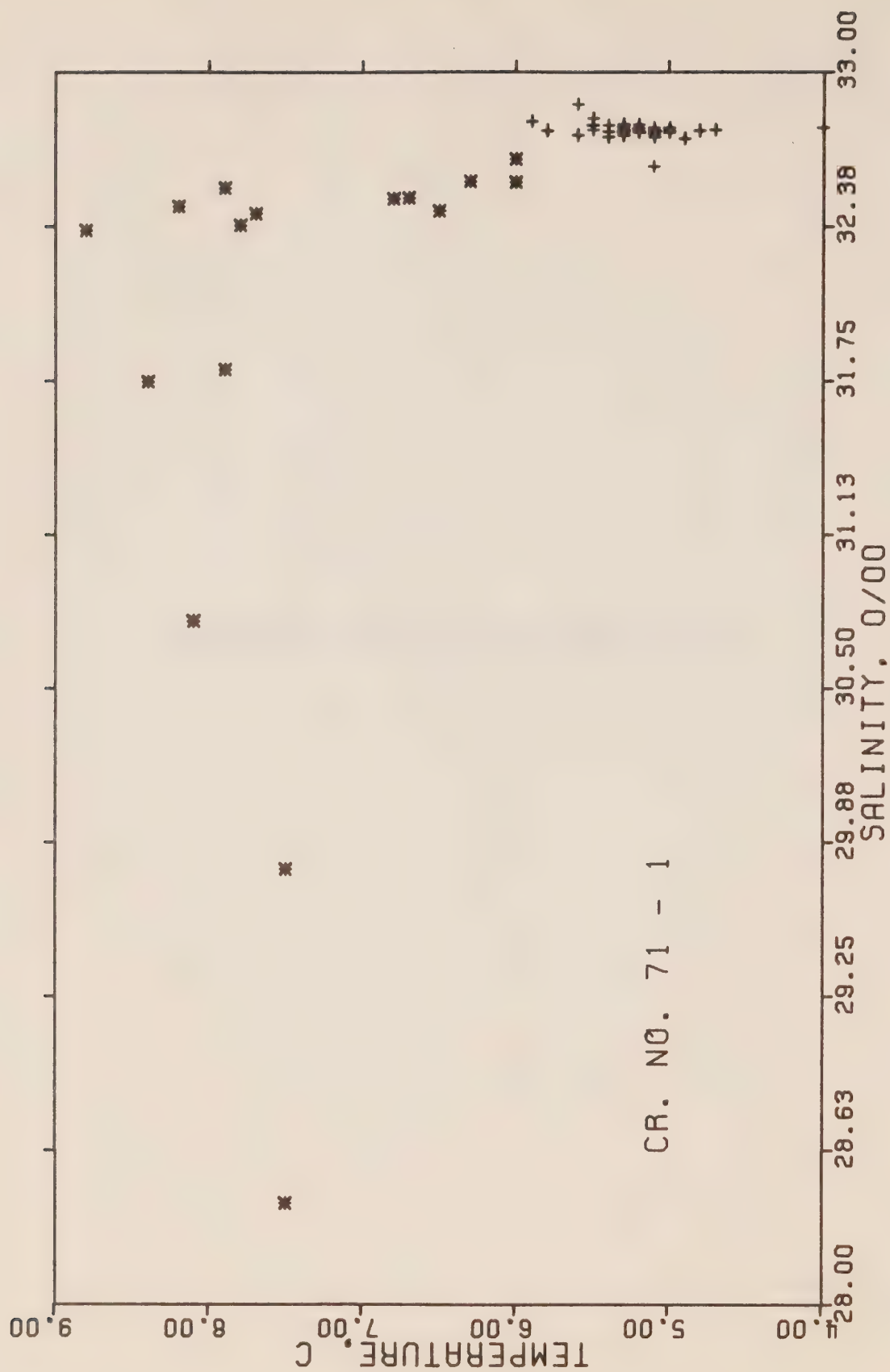


Fig. 10 T-S plot of surface temperature and salinity observations on Line P (asterisks) and at Station P (pluses) during Cruise P-71-1.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 1

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
71	1	9	140	31.746	8.4	125-33
71	1	9	320	30.774	8.1	126- 0
71	1	9	525	32.360	8.8	126-40
71	1	9	904	32.457	8.2	127-40
71	1	9	1500	32.530	7.9	128-40
71	1	9	2220	32.475	0.0	130-40
71	1	10	820	32.444	0.0	132-40
71	1	13	0	32.869	5.6	145- 0
71	1	14	0	32.785	5.4	ON STATION
71	1	15	0	32.776	5.1	ON STATION
71	1	16	0	32.759	5.2	ON STATION
71	1	17	0	32.788	5.3	ON STATION
71	1	18	0	32.760	5.4	ON STATION
71	1	19	0	32.766	5.1	ON STATION
71	1	20	0	32.778	5.3	ON STATION
71	1	21	0	32.766	5.5	ON STATION
71	1	22	0	32.760	5.0	ON STATION
71	1	23	0	32.812	5.5	ON STATION
71	1	24	0	32.766	5.3	ON STATION
71	1	25	0	32.786	5.3	ON STATION
71	1	26	0	32.765	4.7	ON STATION
71	1	27	0	32.775	4.0	ON STATION
71	1	28	0	32.787	5.2	ON STATION
71	1	29	0	32.761	5.0	ON STATION
71	1	30	0	32.776	5.0	ON STATION
71	1	31	0	32.762	5.2	ON STATION
71	2	1	0	32.758	5.1	ON STATION
71	2	2	0	32.764	5.1	ON STATION
71	2	3	0	32.731	4.9	ON STATION
71	2	4	0	32.763	4.8	ON STATION
71	2	5	0	32.755	5.0	ON STATION
71	2	6	0	32.745	5.3	ON STATION
71	2	7	0	32.773	5.2	ON STATION
71	2	8	0	32.758	5.3	ON STATION
71	2	9	0	32.763	5.8	ON STATION
71	2	10	0	32.762	5.0	ON STATION
71	2	11	0	32.749	5.1	ON STATION
71	2	12	0	32.785	5.5	ON STATION
71	2	13	0	32.743	5.6	ON STATION
71	2	14	0	0.0	5.4	ON STATION
71	2	15	0	32.739	5.4	ON STATION
71	2	16	0	32.756	5.2	ON STATION
71	2	17	0	32.736	5.1	ON STATION
71	2	18	0	32.757	5.3	ON STATION
71	2	19	0	32.761	5.2	ON STATION
71	2	20	0	32.757	5.2	ON STATION
71	2	21	0	32.620	5.1	ON STATION
71	2	22	800	32.799	5.9	142-25
71	2	22	1240	32.647	6.0	140-40

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 1

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
71	2	22	1240	32.647	6.0	140-40
71	2	22	1810	32.554	6.0	138-40
71	2	22	2300	32.556	6.3	136-40
71	2	23	505	32.492	6.7	134-40
71	2	23	1000	32.437	6.5	132-40
71	2	23	1410	32.489	6.8	130-40
71	2	23	1917	32.429	7.7	128-40
71	2	23	2156	32.380	7.8	127-40
71	2	24	100	31.798	7.9	126-40
71	2	24	240	28.410	7.5	126- 0
71	2	24	350	29.767	7.5	125-33



OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-71-2  
(C.O.D.C. REFERENCE No. 02-71-002)

SALINITY DIFFERENCE, NANSEN - S.T.D., ‰

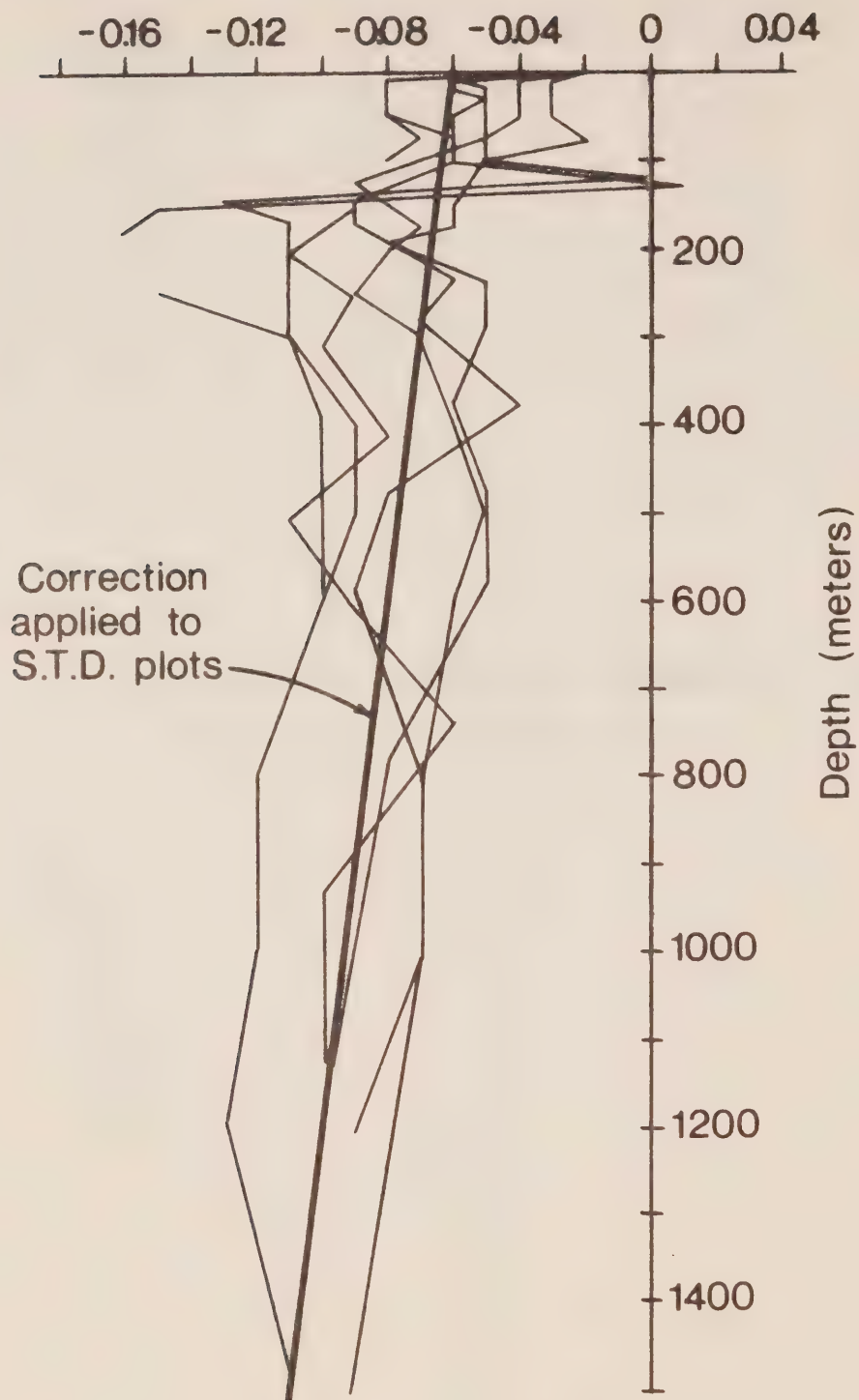


Fig. 11 Profiles of the differences in salinity values obtained from bottles and from a Bissett-Berman Model 9006 STD P-71-2.

TEMPERATURE DIFFERENCE, NANSEN - S.T.D., °C

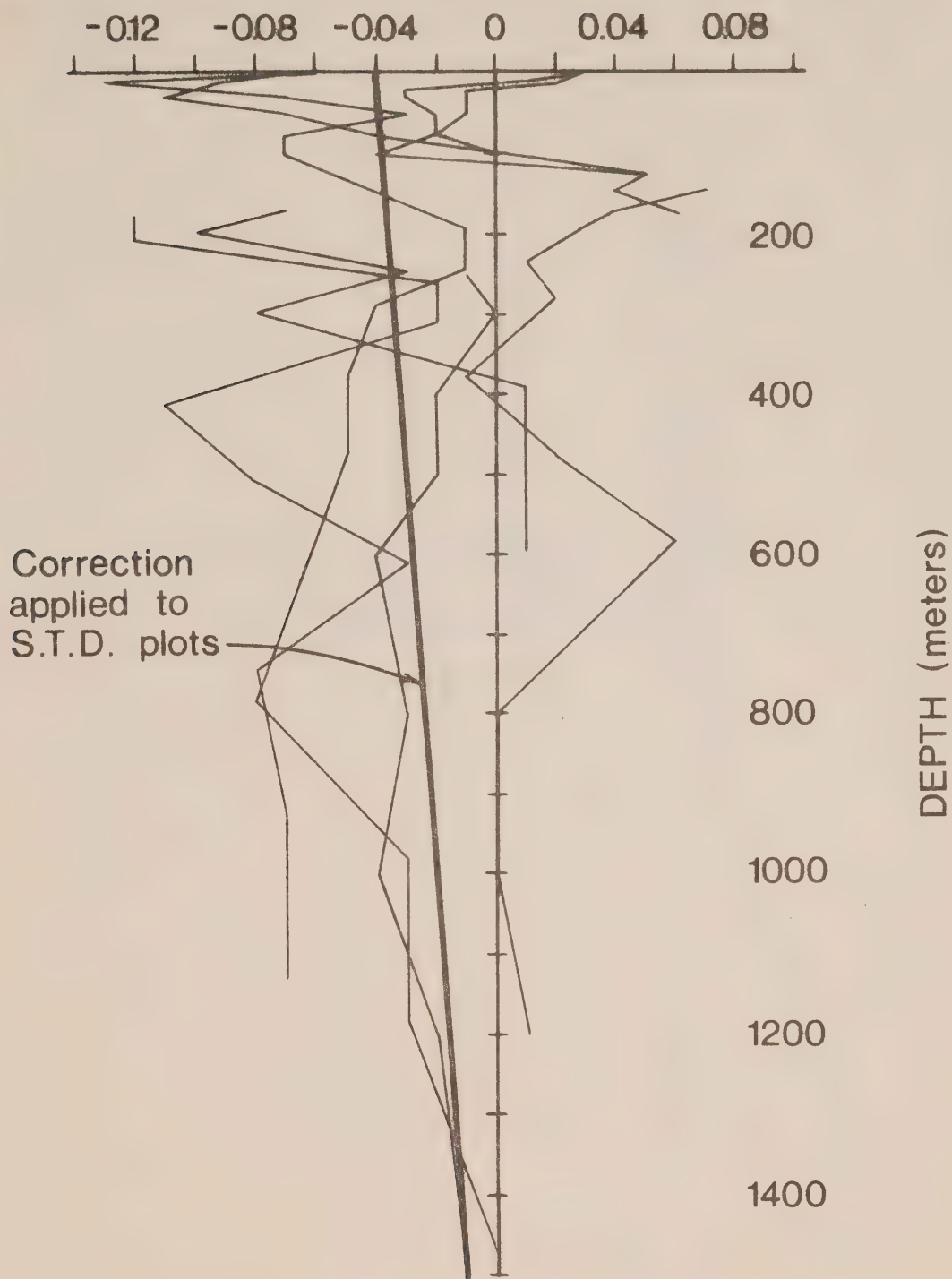


Fig. 12 Profile of the differences in temperatures obtained from reversing thermometers and a Bissett-Berman Model 9006 STD P-71-2.



COMPOSITE PLOTS OF TEMPERATURE, SALINITY  
AND DISSOLVED OXYGEN VS. DEPTH  
(P-71-2)



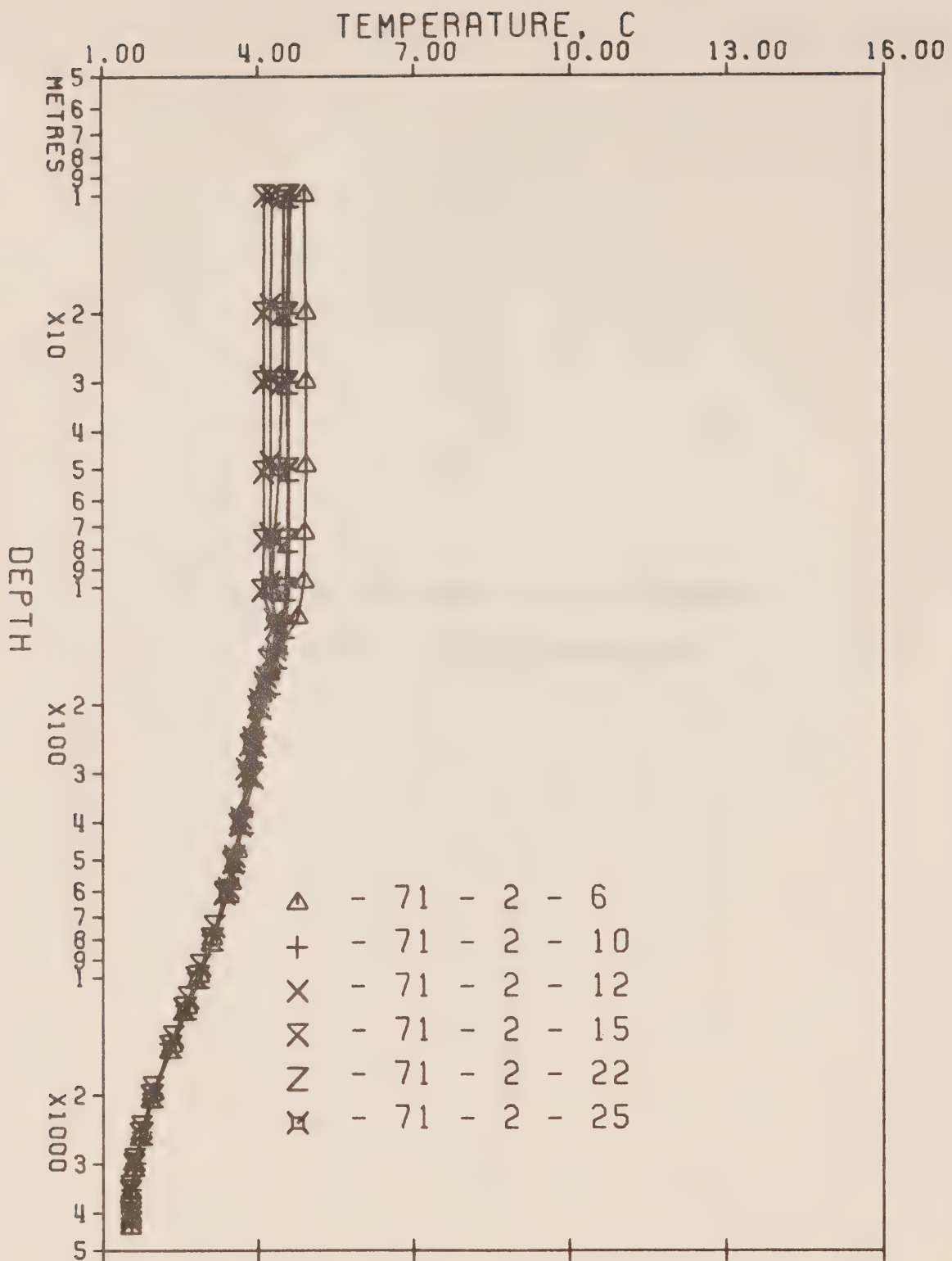


Fig. 13 Composite Plot of temperature vs. Log  
Depth P-71-2. 10

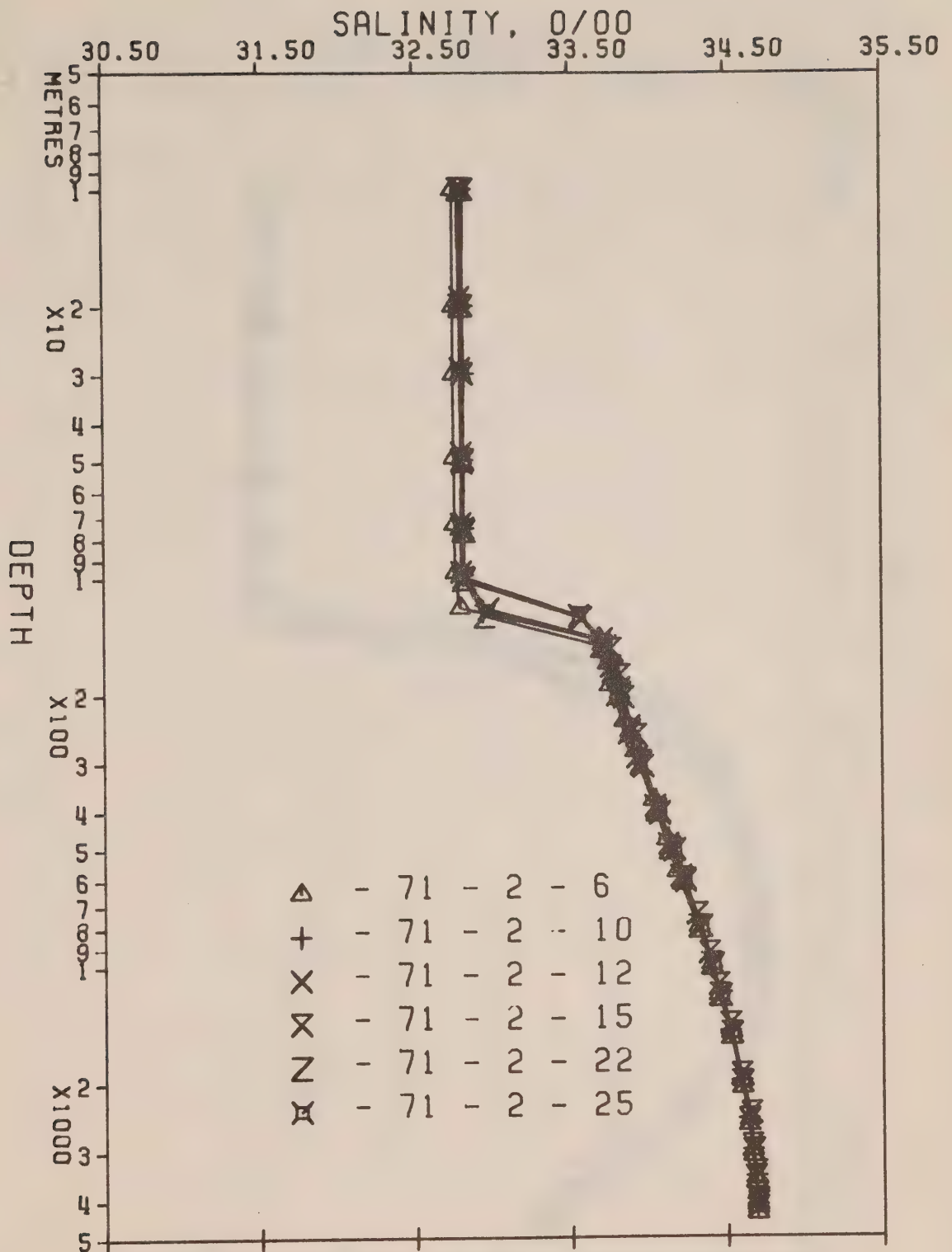
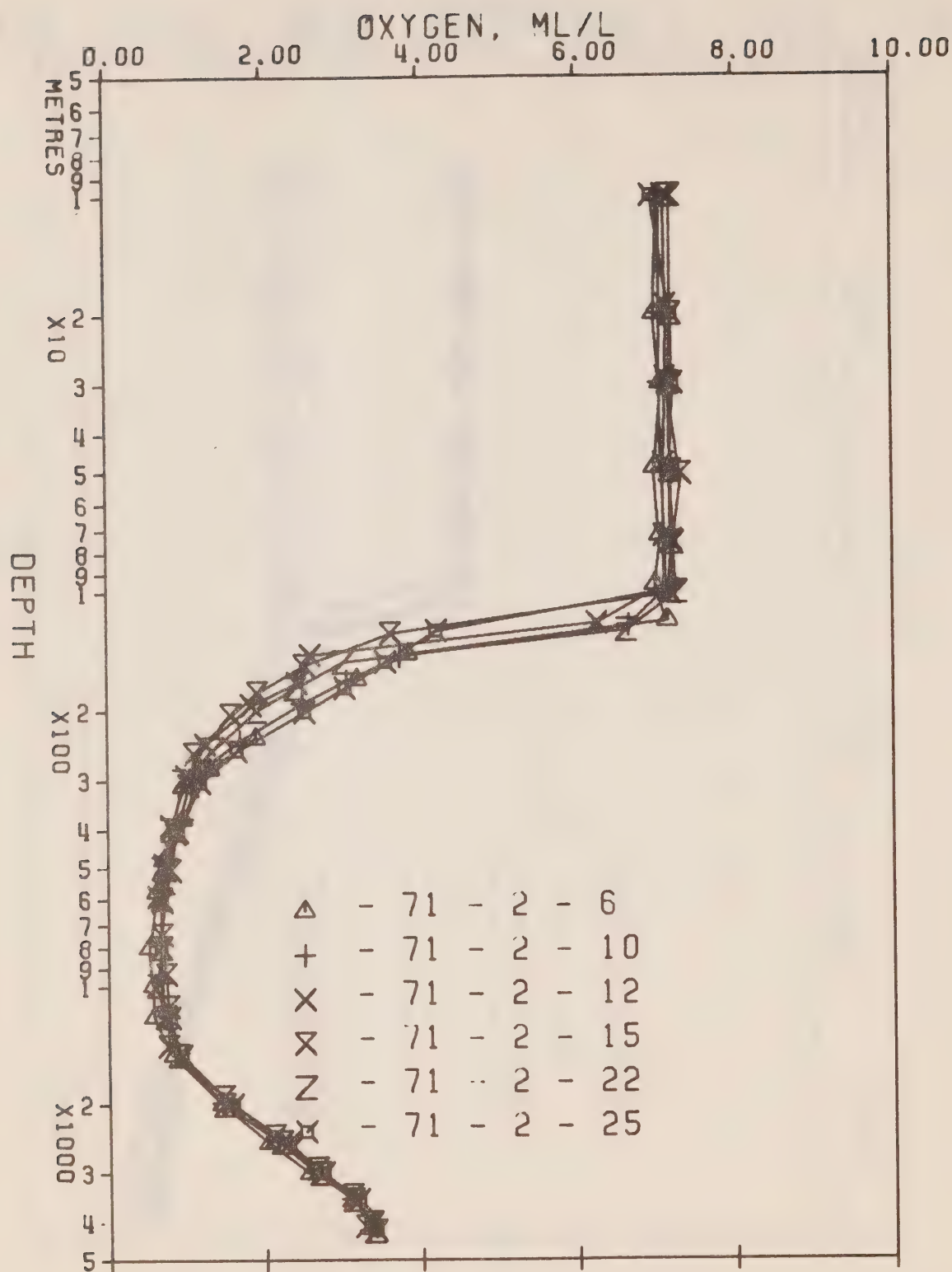
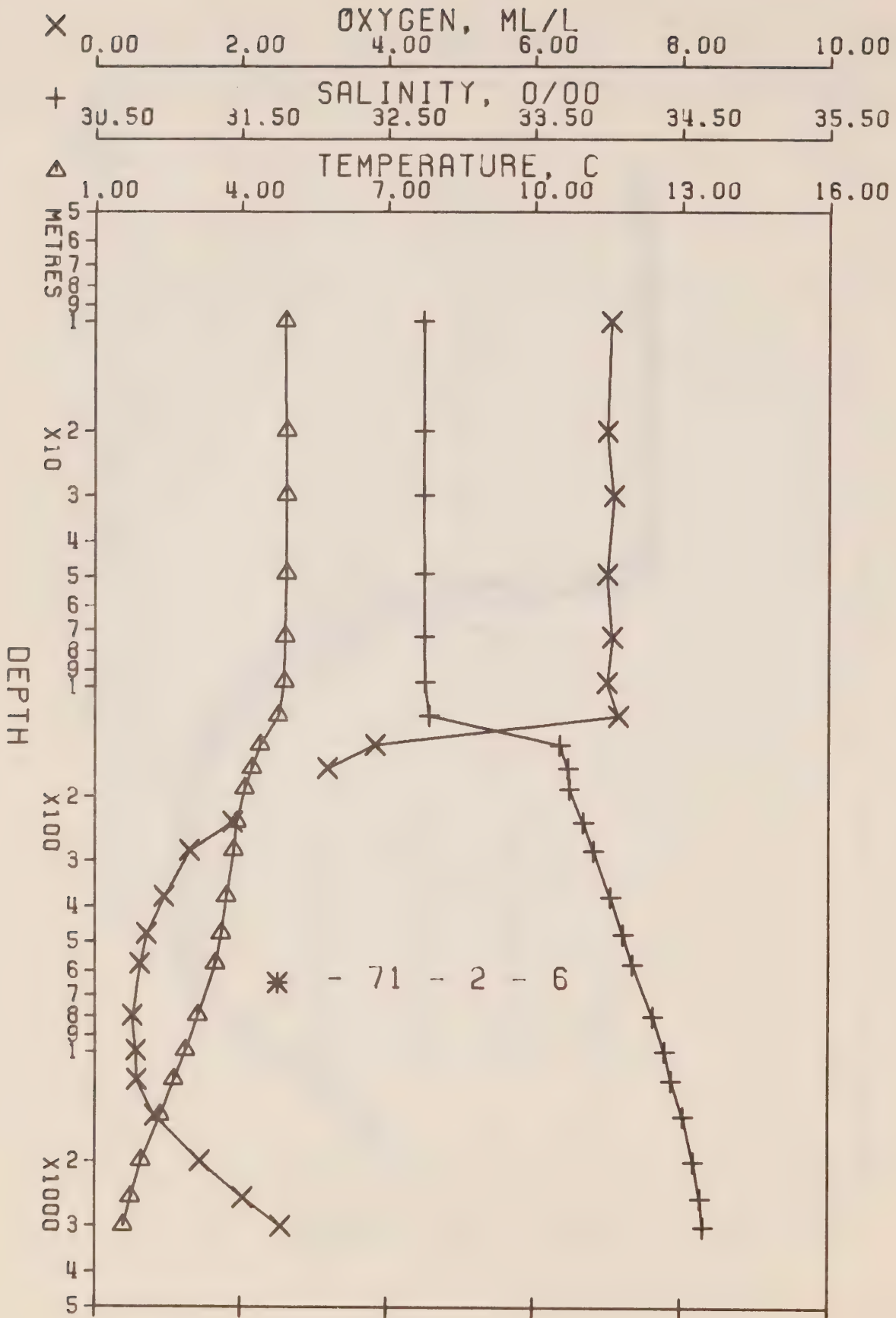


Fig. 14 Composite Plot of salinity vs.  $\text{Log}_{10}$  Depth P-71-2.



RESULTS OF BOTTLE CASTS

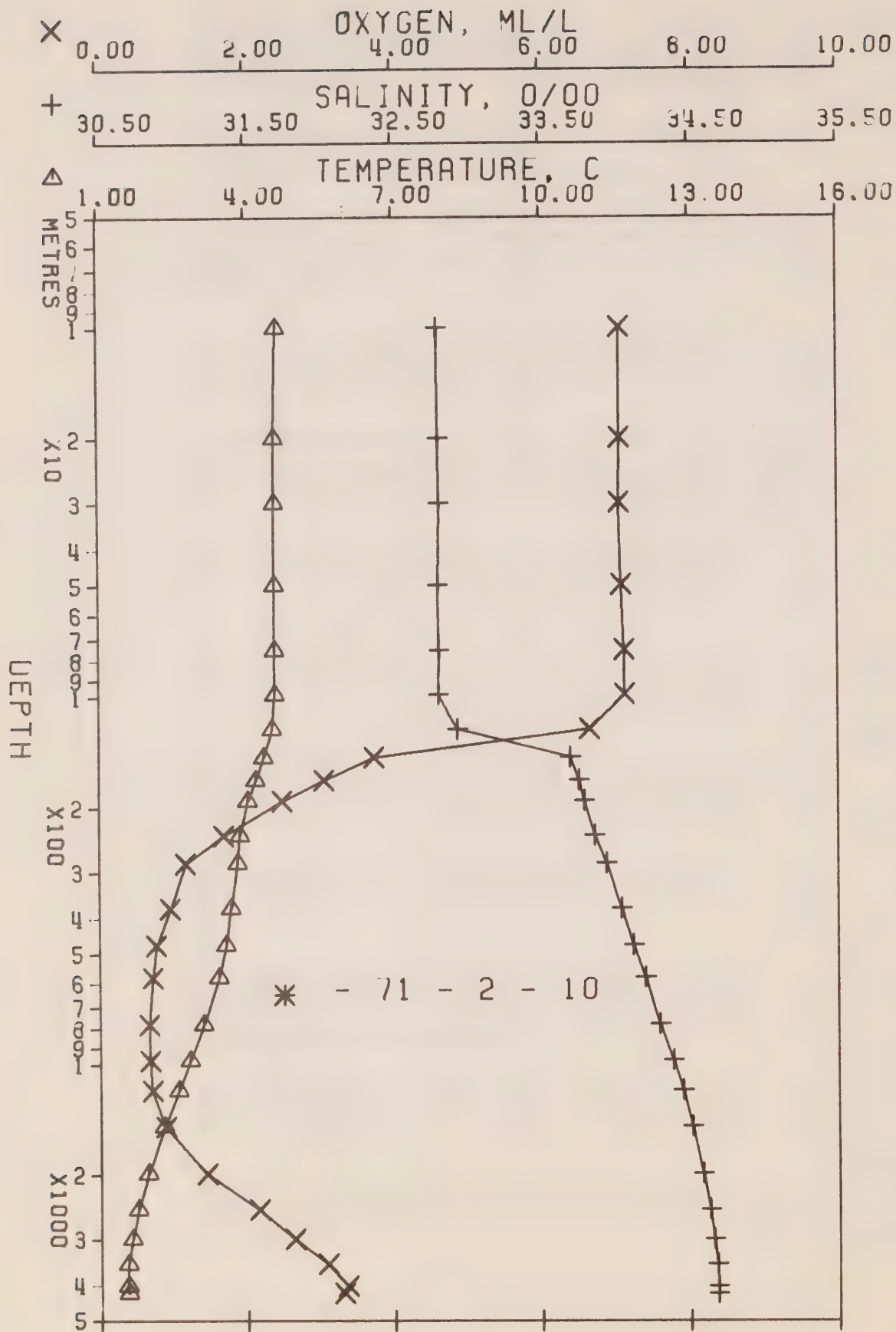
(P-71-2)





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 2- 6      DATE 23/ 2/71  
 POSITION 50- 0.0 N, 145- 0.0 W      GMT 18.6  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.96	32.756	0	25.928	208.7	4.96	208.5	0.0	0.0	7.31	1468.
10	4.89	32.748	10	25.929	208.7	4.89	208.4	0.21	0.01	7.04	1468.
20	4.92	32.749	20	25.927	209.0	4.92	208.5	0.42	0.04	6.99	1468.
30	4.91	32.751	30	25.929	208.9	4.91	208.3	0.63	0.10	7.08	1468.
49	4.92	32.754	49	25.931	208.8	4.92	208.2	1.03	0.26	6.99	1468.
73	4.88	32.756	73	25.937	208.5	4.87	207.6	1.53	0.57	7.06	1469.
98	4.87	32.761	97	25.942	208.3	4.86	207.1	2.04	1.01	6.99	1469.
121	4.75	32.789	120	25.977	205.1	4.74	203.7	2.53	1.56	7.15	1469.
145	4.37	33.682	144	26.725	134.3	4.36	132.7	2.94	2.11	3.83	1469.
168	4.21	33.736	167	26.785	128.8	4.20	127.0	3.23	2.59	3.18	1469.
191	4.06	33.744	190	26.807	126.9	4.05	124.9	3.53	3.13	0.0	1469.
237	3.89	33.839	235	26.899	118.4	3.87	116.1	4.09	4.34	1.88	1469.
283	3.84	33.912	281	26.962	112.7	3.82	110.1	4.62	5.76	1.29	1469.
378	3.68	34.025	375	27.068	103.5	3.65	100.0	5.64	9.20	0.94	1470.
479	3.58	34.108	475	27.144	97.0	3.55	92.8	6.65	13.61	0.70	1472.
579	3.46	34.177	574	27.210	91.3	3.42	86.4	7.59	18.69	0.61	1473.
804	3.10	34.316	797	27.355	78.7	3.05	72.6	9.50	32.13	0.51	1475.
1005	2.85	34.396	995	27.441	71.4	2.78	64.3	11.00	45.93	0.56	1478.
1207	2.61	34.441	1195	27.498	66.5	2.53	58.8	12.39	61.65	0.57	1480.
1510	2.32	34.518	1493	27.584	59.2	2.22	50.5	14.29	87.88	0.82	1484.
2015	1.93	34.591	1990	27.674	51.4	1.79	41.8	17.05	137.49	1.44	1491.
2537	1.72	34.633	2503	27.724	47.6	1.54	36.9	19.62	197.11	2.03	1499.
3045	1.57	34.653	3000	27.751	45.7	1.34	34.1	21.98	264.24	2.55	1507.



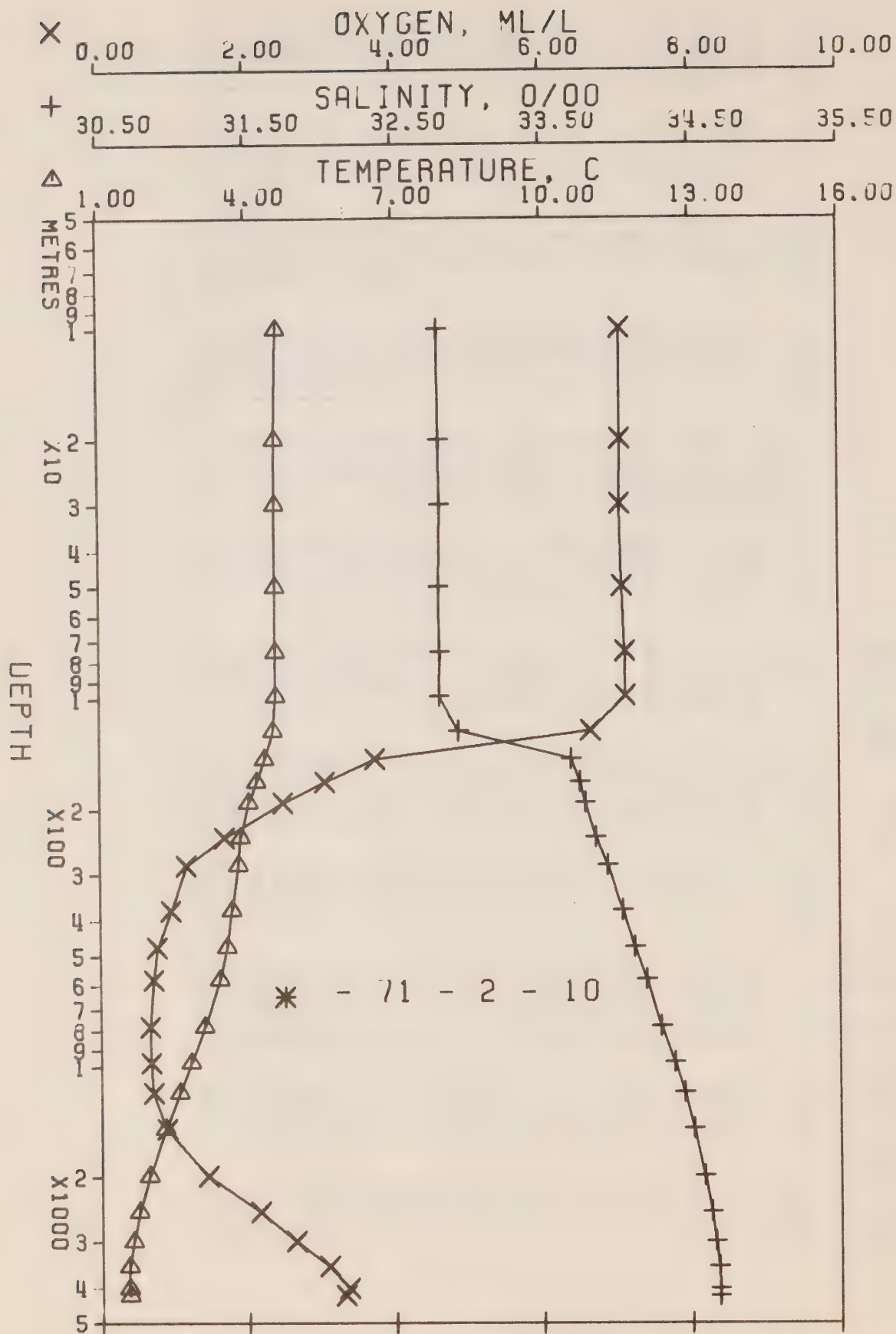
## PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 6 DATE 23/ 2/71

POSITION 50- 0.0 N, 145- 0.0 W GMT 18.6

## HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.96	32.756	0	25.928	208.7	4.96	208.5	0.0	0.0	7.31	1468.
10	4.89	32.748	10	25.929	208.7	4.89	208.4	0.21	0.01	7.04	1468.
20	4.92	32.749	20	25.927	209.0	4.92	208.5	0.42	0.04	6.99	1468.
30	4.91	32.751	30	25.929	208.9	4.91	208.3	0.63	0.10	7.08	1468.
49	4.92	32.754	49	25.931	208.8	4.92	208.2	1.03	0.26	6.99	1468.
73	4.88	32.756	73	25.937	208.5	4.87	207.6	1.53	0.57	7.06	1469.
98	4.87	32.761	97	25.942	208.3	4.86	207.1	2.04	1.01	6.99	1469.
121	4.75	32.789	120	25.977	205.1	4.74	203.7	2.53	1.56	7.15	1469.
145	4.37	33.682	144	26.725	134.3	4.36	132.7	2.94	2.11	3.83	1469.
168	4.21	33.736	167	26.785	128.8	4.20	127.0	3.23	2.59	3.18	1469.
191	4.06	33.744	190	26.807	126.9	4.05	124.9	3.53	3.13	0.0	1469.
237	3.89	33.839	235	26.899	118.4	3.87	116.1	4.09	4.34	1.88	1469.
283	3.84	33.912	281	26.962	112.7	3.82	110.1	4.62	5.76	1.29	1469.
378	3.68	34.025	375	27.068	103.5	3.65	100.0	5.64	9.20	0.94	1470.
479	3.58	34.108	475	27.144	97.0	3.55	92.8	6.65	13.61	0.70	1472.
579	3.46	34.177	574	27.210	91.3	3.42	86.4	7.59	18.69	0.61	1473.
804	3.10	34.316	797	27.355	78.7	3.05	72.6	9.50	32.13	0.51	1475.
1005	2.85	34.396	995	27.441	71.4	2.78	64.3	11.00	45.93	0.56	1478.
1207	2.61	34.441	1195	27.498	66.5	2.53	58.8	12.39	61.65	0.57	1480.
1510	2.32	34.518	1493	27.584	59.2	2.22	50.5	14.29	87.88	0.82	1484.
2015	1.93	34.591	1990	27.674	51.4	1.79	41.8	17.05	137.49	1.44	1491.
2537	1.72	34.633	2503	27.724	47.6	1.54	36.9	19.62	197.11	2.03	1499.
3045	1.57	34.653	3000	27.751	45.7	1.34	34.1	21.98	264.24	2.55	1507.

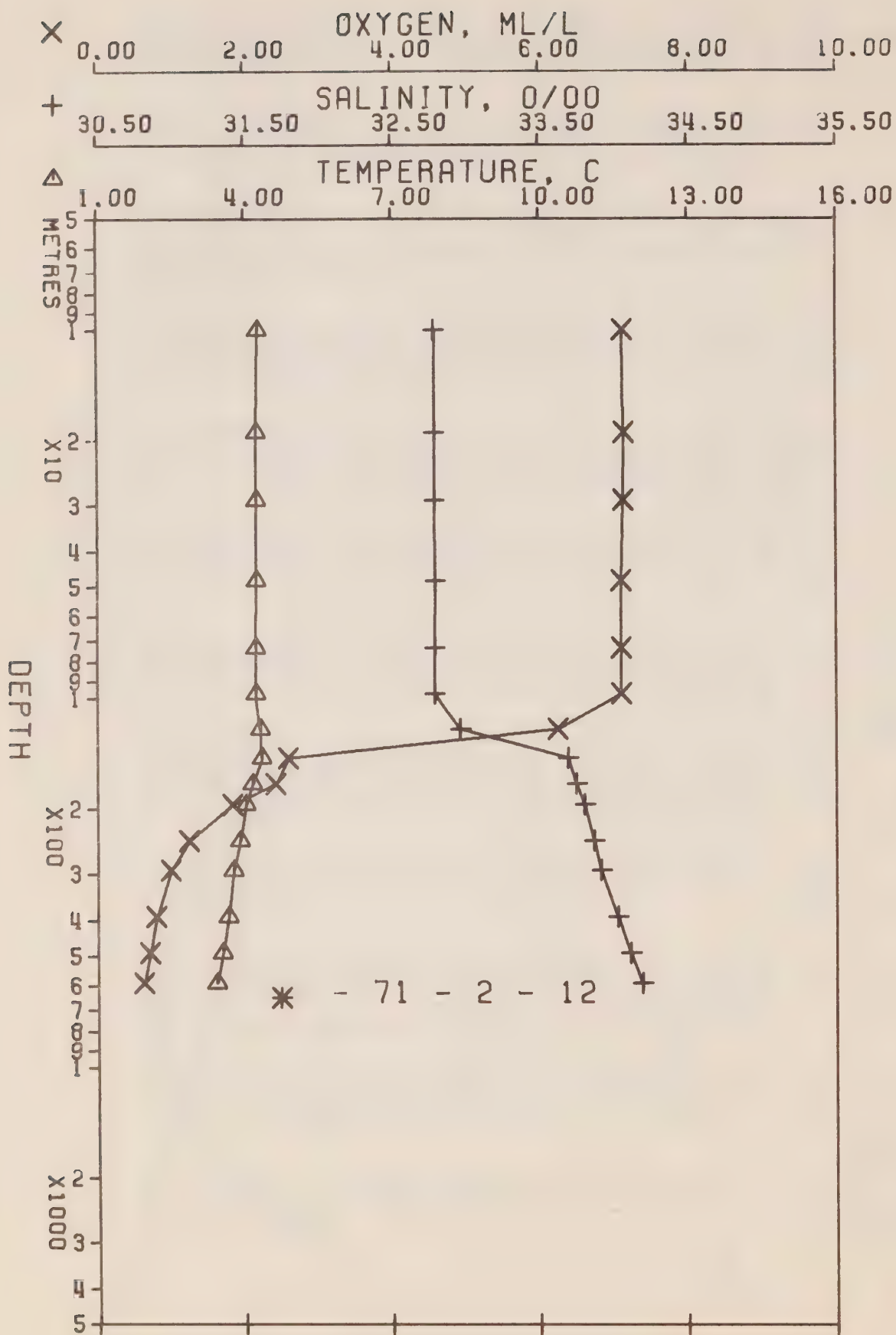




PACIFIC OCEANOGRAPHIC GROUP  
REFERENCE NO. 71- 2- 10 DATE 4/ 3/71  
POSITION 50- 0.0 N, 145- 0.0 W GMT 19.0  
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	PCT. EN	OXY	SOUND
0	4.67	32.815	0	26.006	201.2	4.67	201.0	0.0	0.0	7.07	1467.
10	4.63	32.812	10	26.008	201.1	4.63	200.8	0.20	0.01	7.07	1467.
20	4.59	32.816	20	26.015	200.5	4.59	200.1	0.40	0.04	7.07	1467.
30	4.58	32.821	30	26.021	200.1	4.58	199.7	0.61	0.09	7.06	1467.
50	4.59	32.811	50	26.012	201.1	4.59	200.5	1.01	0.26	7.09	1467.
76	4.58	32.813	75	26.014	201.1	4.57	200.2	1.52	0.58	7.13	1468.
100	4.58	32.812	99	26.013	201.3	4.57	200.3	2.00	1.02	7.13	1468.
124	4.53	32.938	123	26.118	191.6	4.52	190.2	2.49	1.57	6.65	1468.
147	4.34	33.699	146	26.742	132.8	4.33	131.1	2.86	2.09	3.73	1469.
170	4.18	33.759	169	26.806	126.8	4.17	125.0	3.16	2.56	3.05	1469.
193	4.02	33.793	192	26.850	122.8	4.01	120.8	3.45	3.10	2.48	1468.
240	3.85	33.867	238	26.926	115.9	3.83	113.6	4.00	4.32	1.68	1469.
286	3.80	33.944	284	26.992	110.0	3.78	107.3	4.52	5.72	1.16	1469.
379	3.67	34.043	376	27.083	102.0	3.64	98.6	5.50	9.05	0.95	1470.
478	3.56	34.125	474	27.159	95.5	3.53	91.4	6.48	13.31	0.76	1472.
584	3.41	34.206	579	27.238	88.6	3.37	83.8	7.45	18.59	0.71	1473.
786	3.10	34.302	779	27.344	79.6	3.05	73.6	9.15	30.43	0.66	1475.
587	2.82	34.390	977	27.439	71.3	2.75	64.5	10.66	44.05	0.67	1477.
1188	2.57	34.454	1176	27.512	65.1	2.49	57.6	12.03	59.24	0.70	1480.
1492	2.28	34.513	1476	27.584	59.0	2.18	50.6	13.90	84.90	0.88	1483.
2004	1.94	34.586	1979	27.669	51.9	1.80	42.3	16.72	134.99	1.44	1491.
2518	1.73	34.631	2484	27.721	47.8	1.55	37.1	19.26	193.62	2.15	1498.
3035	1.62	34.655	2991	27.749	46.3	1.39	34.3	21.68	262.33	2.63	1507.
3553	1.52	34.677	3497	27.774	44.7	1.24	31.6	24.03	340.99	3.08	1515.
4070	1.53	34.682	4001	27.777	45.9	1.20	30.8	26.36	431.40	3.35	1524.
4276	1.54	34.680	4202	27.775	46.8	1.18	30.9	27.31	472.08	3.30	1528.





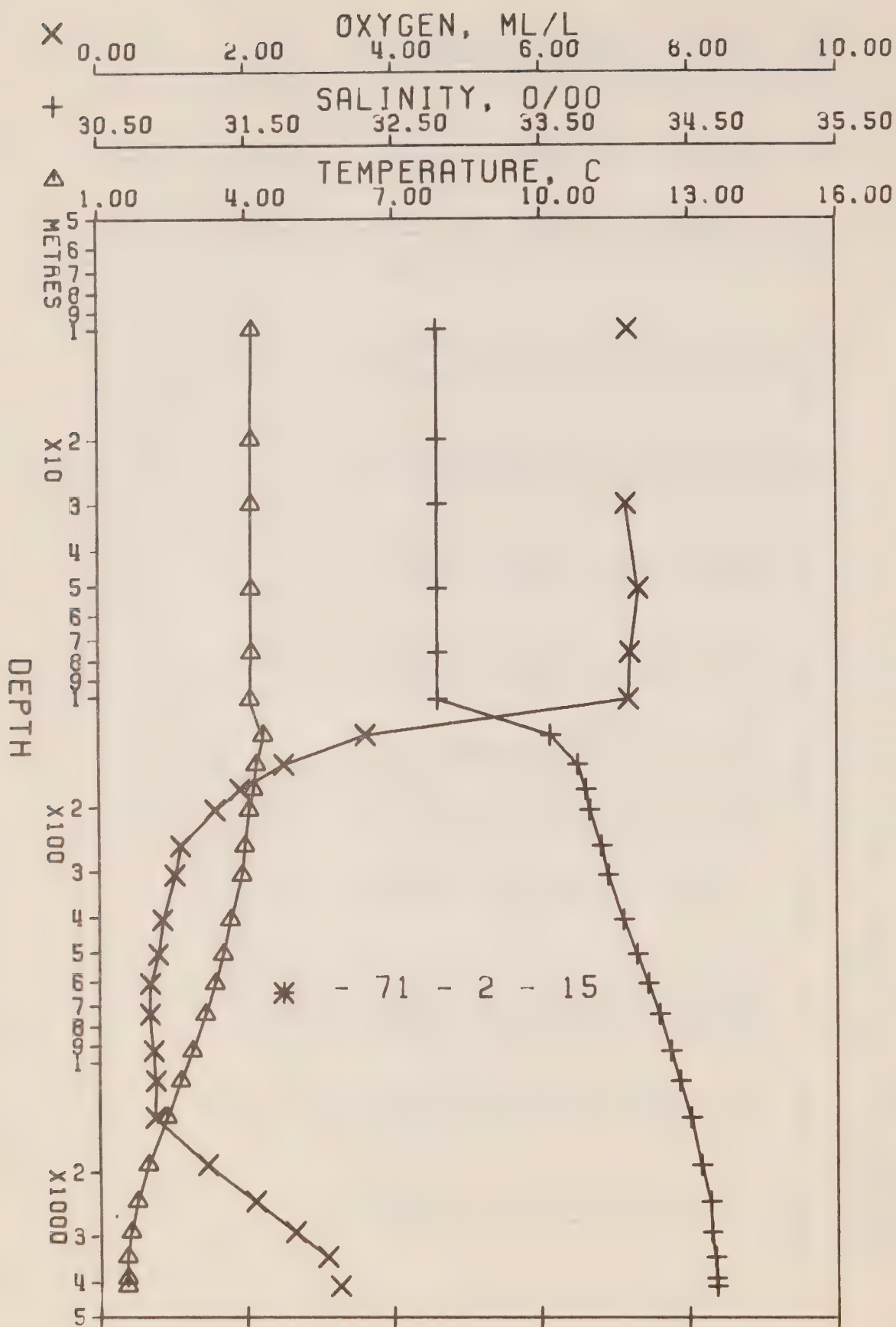
# PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 12 DATE 9/ 3/71

POSITION 50- 0.0 N, 145- 0.0 W GMT 18.6

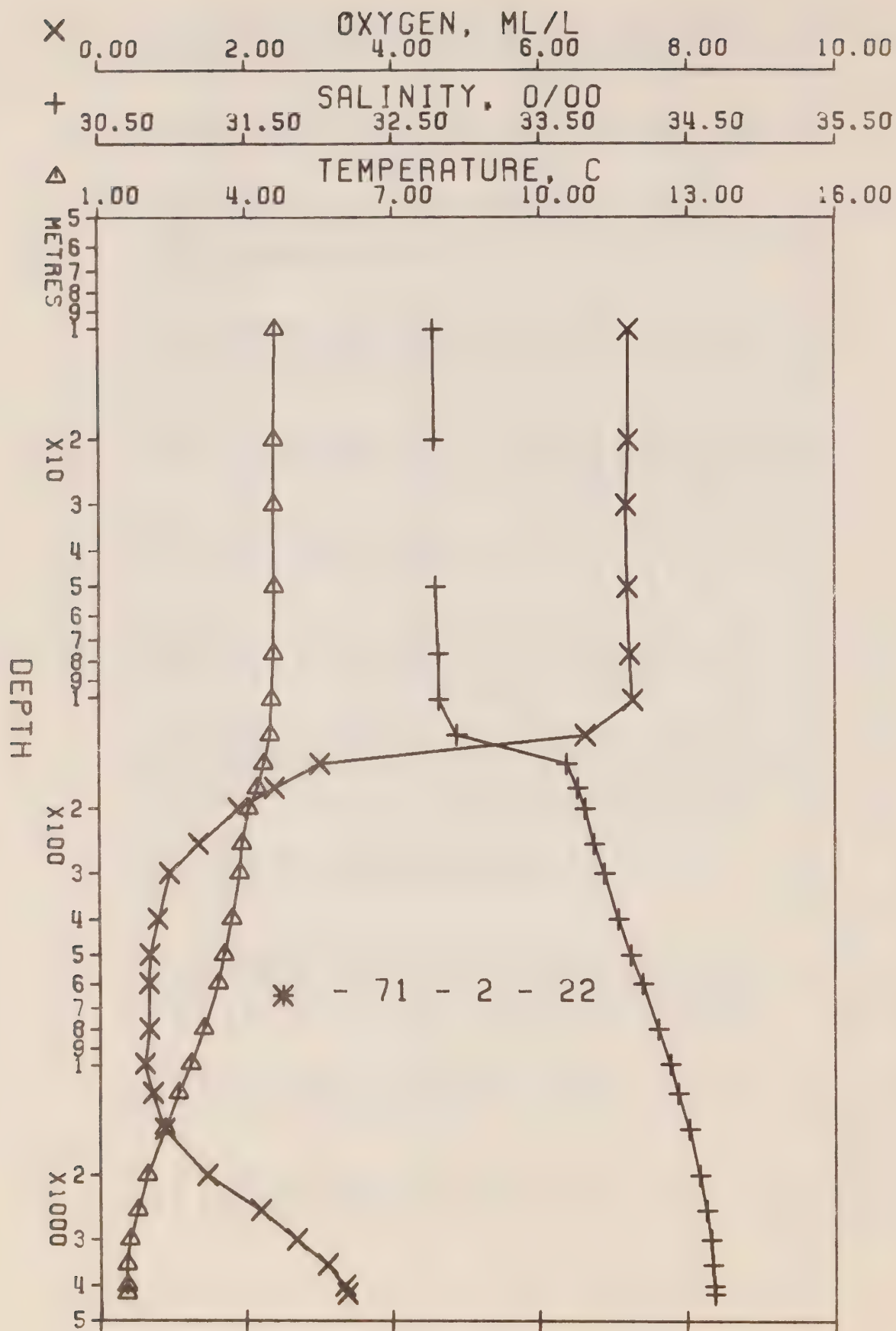
## HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.28	32.795	0	26.031	198.9	4.28	198.7	0.0	0.0	7.14	1465.
10	4.27	32.793	10	26.031	199.0	4.27	198.7	0.20	0.01	7.13	1465.
19	4.24	32.794	19	26.035	198.7	4.24	198.3	0.38	0.04	7.15	1465.
29	4.24	32.797	29	26.037	198.6	4.24	198.1	0.58	0.09	7.14	1465.
48	4.24	32.798	48	26.038	198.6	4.24	198.0	0.96	0.24	7.11	1466.
73	4.23	32.797	73	26.038	198.8	4.22	198.0	1.46	0.55	7.11	1466.
98	4.22	32.796	97	26.038	199.0	4.21	198.0	1.94	0.97	7.11	1466.
122	4.32	32.969	121	26.165	187.1	4.31	185.9	2.42	1.50	6.25	1467.
146	4.35	33.700	145	26.742	132.8	4.34	131.1	2.80	2.02	2.59	1469.
171	4.15	33.757	170	26.808	126.7	4.14	124.8	3.12	2.54	2.42	1469.
195	4.02	33.811	194	26.864	121.5	4.01	119.5	3.42	3.10	1.83	1469.
245	3.90	33.874	243	26.926	115.9	3.88	113.6	4.01	4.41	1.24	1469.
294	3.76	33.921	292	26.977	111.4	3.74	108.6	4.57	5.96	0.99	1469.
393	3.65	34.036	390	27.080	102.4	3.62	98.9	5.62	9.65	0.79	1470.
493	3.54	34.121	489	27.158	95.7	3.51	91.4	6.61	14.12	0.70	1472.
594	3.41	34.199	589	27.233	89.3	3.37	84.3	7.55	19.28	0.62	1473.



PACIFIC OCEANOGRAPHIC GROUP  
REFERENCE NO. 71- 2- 15 DATE 15/ 3/71  
POSITION 50- 0.0 N, 145- 0.0 W GMT 18.3  
HYDROGRAPHIC CAST DATA

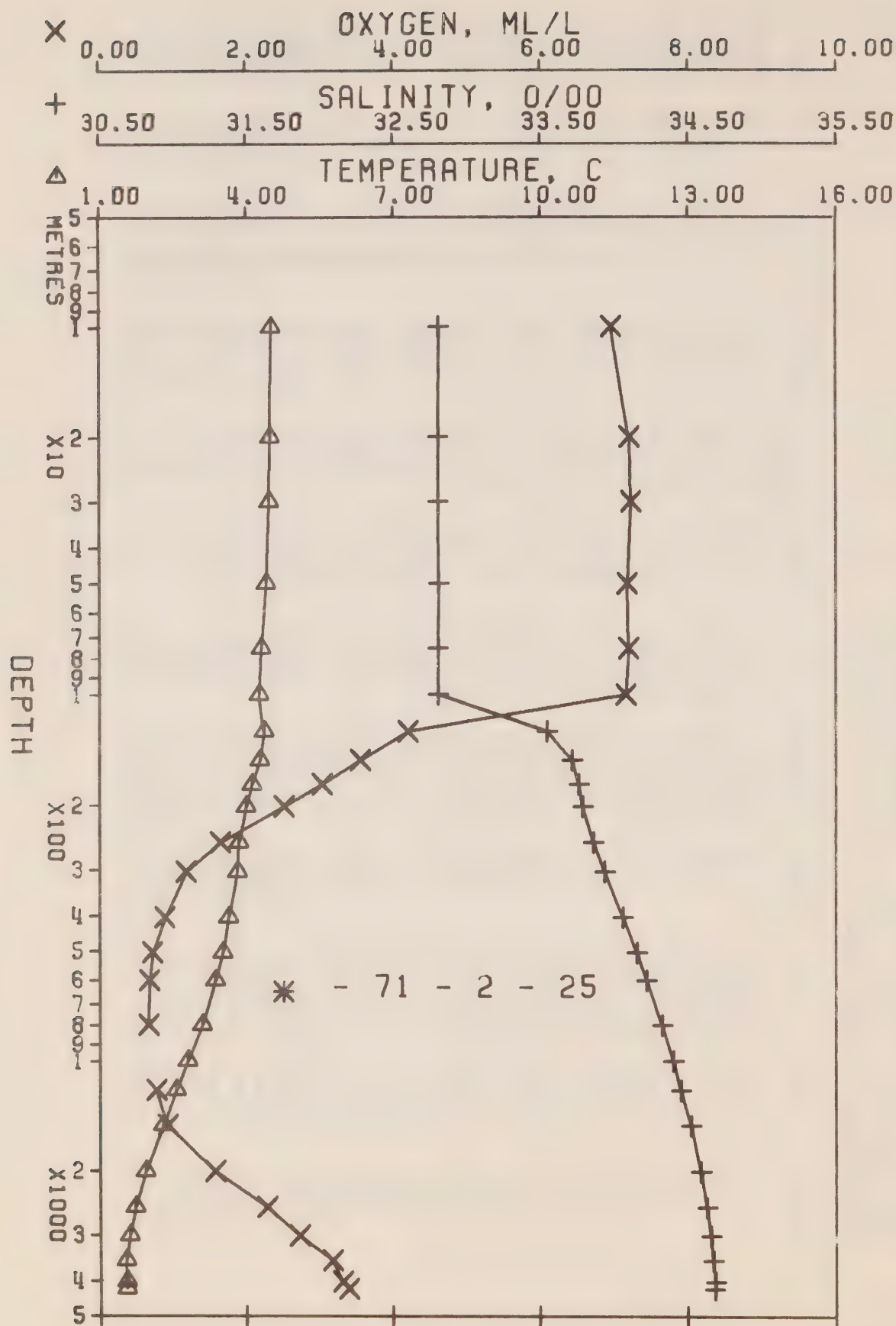
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.14	32.803	0	26.052	196.9	4.14	196.7	0.0	0.0	7.15	1464.
10	4.12	32.804	10	26.055	196.7	4.12	196.4	0.20	0.01	7.19	1465.
20	4.11	32.804	20	26.056	196.7	4.11	196.3	0.40	0.04	0.0	1465.
30	4.10	32.803	30	26.056	196.8	4.10	196.3	0.59	0.09	7.16	1465.
51	4.10	32.804	51	26.057	196.8	4.10	196.2	1.01	0.26	7.33	1465.
77	4.10	32.807	76	26.059	196.8	4.09	196.0	1.51	0.59	7.21	1466.
103	4.08	32.804	102	26.059	197.0	4.07	196.0	2.03	1.07	7.19	1466.
129	4.35	33.571	128	26.639	142.3	4.34	140.8	2.48	1.59	3.62	1469.
155	4.20	33.755	154	26.801	127.2	4.19	125.5	2.82	2.09	2.51	1469.
181	4.13	33.810	180	26.852	122.5	4.12	120.6	3.15	2.65	1.91	1469.
207	4.05	33.837	205	26.882	119.9	4.04	117.8	3.45	3.25	1.57	1469.
259	3.95	33.914	257	26.953	113.5	3.93	111.0	4.06	4.70	1.10	1469.
311	3.89	33.959	309	26.995	110.0	3.87	107.0	4.65	6.41	1.02	1470.
412	3.66	34.065	409	27.102	100.5	3.63	96.8	5.71	10.33	0.85	1471.
511	3.50	34.154	507	27.188	93.0	3.46	88.6	6.67	14.82	0.79	1472.
614	3.34	34.229	609	27.263	86.4	3.30	81.4	7.59	20.12	0.68	1473.
746	3.14	34.305	739	27.343	79.6	3.09	73.8	8.68	27.66	0.68	1474.
939	2.87	34.382	930	27.428	72.2	2.81	65.6	10.14	40.21	0.73	1477.
1134	2.63	34.442	1123	27.497	66.3	2.55	58.9	11.49	54.49	0.76	1479.
1431	2.35	34.513	1415	27.578	59.5	2.25	51.2	13.35	78.72	0.75	1483.
1932	1.96	34.586	1909	27.668	51.9	1.83	42.5	16.12	126.25	1.46	1489.
2441	1.74	34.647	2409	27.734	46.6	1.57	36.0	18.60	181.51	2.11	1497.
2954	1.60	34.652	2911	27.748	46.0	1.38	34.3	20.95	246.42	2.65	1505.
3466	1.53	34.673	3412	27.770	44.9	1.26	32.0	23.28	322.40	3.09	1514.
3974	1.52	34.678	3908	27.775	45.8	1.20	31.2	25.58	409.88	0.0	1522.
4177	1.52	34.686	4105	27.781	45.7	1.18	30.5	26.51	448.33	3.26	1526.





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 2- 22 DATE 24/ 3/71  
 POSITION 50- 0.0 N, 145- 0.0 W GMT 18.2  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.67	32.817	0	26.008	201.1	4.67	200.8	0.0	0.0	7.18	1467.
10	4.60	32.786	10	25.991	202.8	4.60	202.5	0.20	0.01	7.21	1467.
20	4.57	32.788	20	25.995	202.4	4.57	202.0	0.41	0.04	7.21	1467.
30	4.57	32.792*	30	25.998	202.2	4.57	201.8	0.61	0.09	7.18	1467.
50	4.58	32.802	50	26.005	201.8	4.58	201.0	1.02	0.26	7.20	1467.
77	4.57	32.820	76	26.021	200.5	4.56	199.6	1.54	0.60	7.23	1468.
102	4.53	32.819	101	26.024	200.4	4.52	199.2	2.05	1.06	7.27	1468.
127	4.50	32.944	126	26.126	190.9	4.49	189.5	2.55	1.65	6.62	1468.
152	4.36	33.690	151	26.733	133.6	4.35	132.0	2.96	2.22	3.01	1469.
177	4.22	33.764	176	26.806	126.8	4.21	125.0	3.28	2.76	2.39	1469.
201	4.05	33.814	200	26.863	121.6	4.04	119.6	3.58	3.34	1.89	1469.
252	3.91	33.876	250	26.927	116.0	3.89	113.5	4.18	4.72	1.35	1469.
302	3.87	33.945	300	26.986	110.8	3.85	107.9	4.75	6.33	0.95	1470.
402	3.70	34.041	399	27.079	102.6	3.67	98.9	5.81	10.15	0.79	1471.
503	3.53	34.127	499	27.164	95.2	3.50	90.9	6.81	14.76	0.68	1472.
604	3.41	34.204	599	27.237	89.0	3.37	83.9	7.74	20.00	0.67	1473.
802	3.12	34.309	795	27.348	79.5	3.07	73.3	9.40	31.91	0.67	1475.
1004	2.84	34.388	994	27.436	71.9	2.77	64.8	10.92	45.89	0.61	1478.
1206	2.59	34.440	1194	27.499	66.4	2.51	58.7	12.32	61.64	0.72	1480.
1511	2.30	34.516	1494	27.584	59.1	2.20	50.5	14.22	87.96	0.88	1484.
2021	1.95	34.587	1996	27.669	52.0	1.81	42.3	17.02	138.42	1.46	1491.
2533	1.75	34.629	2499	27.718	48.3	1.57	37.4	19.57	197.76	2.19	1499.
3047	1.59	34.658	3002	27.754	45.7	1.36	33.8	21.98	266.04	2.68	1507.
3561	1.52	34.672	3505	27.770	45.1	1.24	31.9	24.30	344.33	3.10	1515.
4077	1.52	34.680	4008	27.776	45.9	1.19	30.9	26.64	435.57	3.34	1524.
4283	1.53	34.686	4209	27.780	46.2	1.17	30.4	27.59	476.07	3.37	1528.



PACIFIC OCEANOGRAPHIC GROUP  
REFERENCE NO. 71- 2- 25 DATE 30/ 3/71  
POSITION 50- 0.0 N. 145- 0.0 W GMT 18.2  
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.57	32.812	0	26.014	200.4	4.57	200.2	0.0	0.0	7.21	1466.
10	4.50	32.813	10	26.023	199.8	4.50	199.5	0.20	0.01	6.96	1466.
20	4.48	32.812	20	26.024	199.7	4.48	199.3	0.40	0.04	7.21	1466.
30	4.47	32.812	30	26.025	199.7	4.47	199.2	0.60	0.09	7.23	1466.
50	4.41	32.815	50	26.034	199.0	4.41	198.4	1.00	0.26	7.18	1466.
76	4.30	32.809	75	26.040	198.6	4.29	197.8	1.51	0.58	7.20	1466.
101	4.26	32.810	100	26.045	198.3	4.25	197.2	2.01	1.04	7.16	1467.
127	4.36	33.548	126	26.620	144.1	4.35	142.6	2.46	1.55	4.20	1468.
152	4.27	33.718	151	26.764	130.6	4.26	129.0	2.80	2.04	3.55	1469.
177	4.11	33.763	176	26.817	125.8	4.10	124.0	3.12	2.58	3.03	1469.
203	3.99	33.792	202	26.852	122.6	3.98	120.6	3.45	3.21	2.51	1469.
255	3.83	33.863	253	26.924	116.1	3.81	113.7	4.06	4.64	1.64	1469.
306	3.80	33.940	304	26.989	110.5	3.78	107.6	4.65	6.31	1.17	1470.
407	3.63	34.067	404	27.106	100.0	3.60	96.4	5.70	10.16	0.88	1471.
508	3.50	34.159	504	27.192	92.5	3.46	88.2	6.67	14.68	0.71	1472.
605	3.35	34.227	600	27.261	86.7	3.31	81.6	7.54	19.61	0.67	1473.
804	3.09	34.330	797	27.367	77.6	3.04	71.5	9.17	31.31	0.66	1475.
1007	2.79	34.405	997	27.454	70.1	2.72	63.2	10.66	45.05	0.0	1477.
1209	2.55	34.457	1197	27.516	64.8	2.47	57.1	12.02	60.45	0.77	1480.
1515	2.27	34.523	1498	27.593	58.3	2.17	49.8	13.89	86.43	0.92	1484.
2024	1.91	34.591	1999	27.676	51.2	1.77	41.7	16.65	136.21	1.57	1491.
2535	1.70	34.628	2501	27.721	47.7	1.52	37.1	19.17	194.63	2.28	1498.
3047	1.58	34.653	3002	27.750	45.8	1.35	34.1	21.55	262.46	2.72	1507.
3558	1.51	34.671	3502	27.770	45.0	1.23	31.9	23.87	340.42	3.17	1515.
4070	1.52	34.686	4001	27.781	45.5	1.19	30.5	26.17	429.86	3.31	1524.
4273	1.52	34.679	4199	27.775	46.5	1.17	30.9	27.10	469.59	3.39	1527.



RESULTS OF STD CASTS

(P-71-2)



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 1

DATE 20/ 2/71

POSITION 48-33.0N, 125-33.0W GMT 1.0

RESULTS OF STP CAST 35 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.81	28.83	0	22.49	536.0	0.0	0.0	1474.
10	7.74	29.60	10	23.10	477.9	0.53	0.03	1475.
20	7.16	31.65	20	24.79	317.4	0.90	0.08	1476.
30	8.12	32.21	30	25.09	288.6	1.20	0.16	1480.
50	8.05	32.72	50	25.50	249.9	1.74	0.38	1481.
75	7.41	33.13	75	25.92	210.6	2.31	0.74	1479.
100	7.34	33.29	99	26.05	198.6	2.83	1.20	1480.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	7.81	28.83	38.	8.29	32.48
2.	7.87	28.85	43.	8.31	32.55
4.	7.83	28.86	44.	8.26	32.57
6.	7.76	28.89	45.	8.00	32.58
9.	7.67	29.15	46.	8.00	32.61
11.	7.81	30.05	49.	8.10	32.70
14.	7.66	30.75	50.	8.05	32.72
15.	7.27	30.85	55.	8.03	32.78
16.	7.39	31.35	58.	7.96	32.82
17.	7.12	31.36	60.	7.71	32.92
18.	7.10	31.45	66.	7.39	33.09
20.	7.16	31.65	69.	7.39	33.11
22.	7.16	31.75	70.	7.41	33.12
24.	7.96	32.05	80.	7.41	33.15
25.	8.06	32.11	88.	7.45	33.19
28.	8.08	32.17	96.	7.41	33.26
32.	8.16	32.25	100.	7.34	33.29
34.	8.26	32.33			

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 2

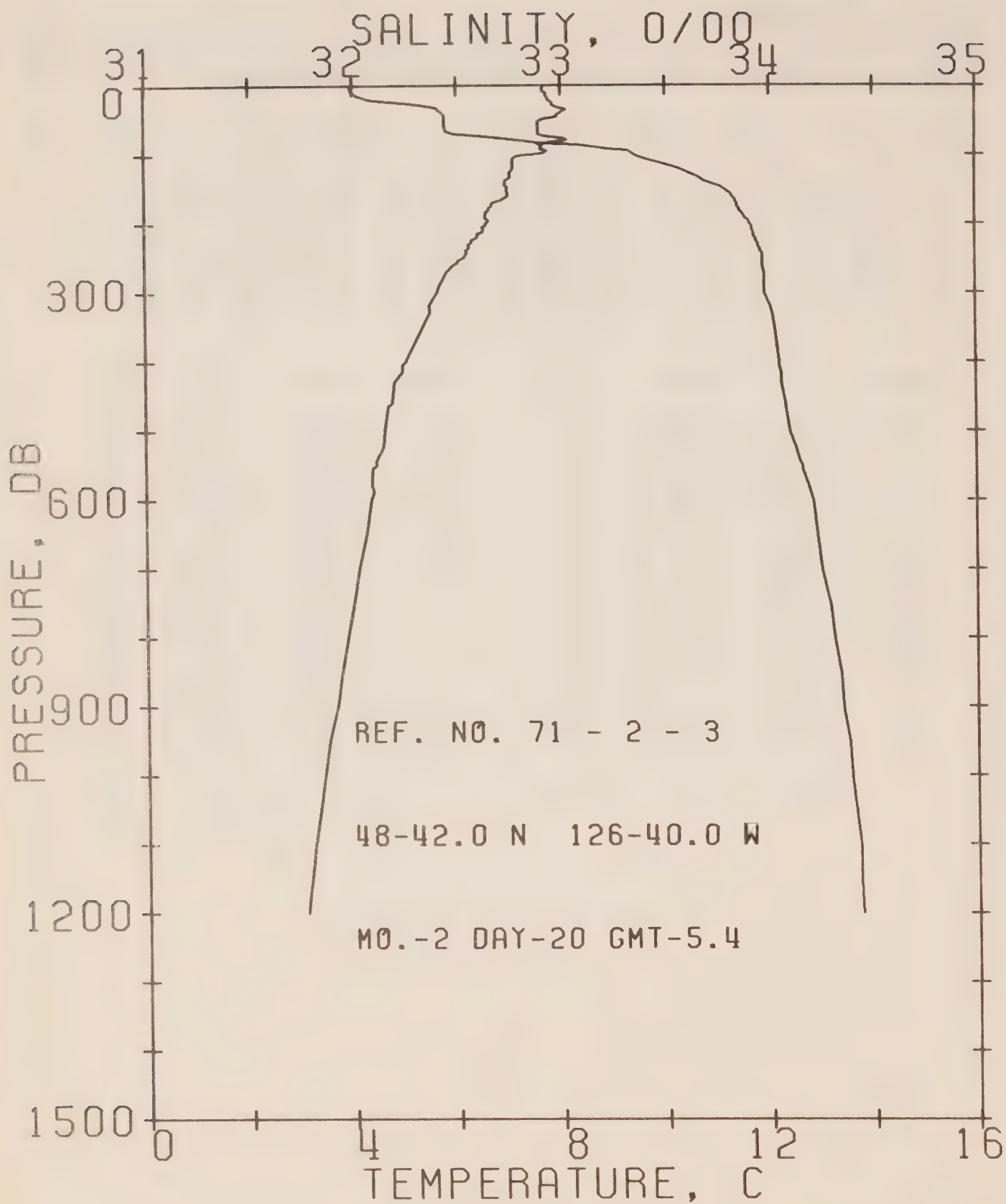
DATE 20/ 2/71

POSITION 48-38.0N, 126- 0.0W GMT 3.0

RESULTS OF STP CAST 30 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.37	29.28	0	22.90	496.8	0.0	0.0	1473.
10	7.51	30.11	10	23.53	436.8	0.48	0.02	1475.
20	7.52	31.01	20	24.24	369.8	0.89	0.09	1476.
30	7.77	31.77	30	24.80	316.6	1.22	0.17	1478.
50	8.25	32.31	50	25.15	283.0	1.82	0.41	1481.
75	8.06	32.59	75	25.40	259.8	2.49	0.84	1481.
100	8.02	33.05	99	25.77	225.8	3.11	1.39	1482.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	7.37	29.28	41.	8.11	32.17
2.	7.36	29.28	48.	8.25	32.29
4.	7.36	29.28	55.	8.25	32.37
5.	7.39	29.31	58.	8.31	32.41
7.	7.39	29.55	61.	8.30	32.45
10.	7.51	30.11	63.	8.21	32.47
16.	7.55	30.55	64.	8.24	32.49
17.	7.52	30.61	66.	8.12	32.51
20.	7.52	31.01	68.	8.12	32.55
22.	7.54	31.45	70.	8.06	32.57
23.	7.66	31.55	78.	8.06	32.61
25.	7.68	31.60	84.	8.12	32.69
26.	7.74	31.63	90.	8.15	32.82
30.	7.77	31.77	96.	8.14	32.93
36.	7.77	31.92	100.	8.02	33.05



PACIFIC OCEANOGRAPHIC GROUP

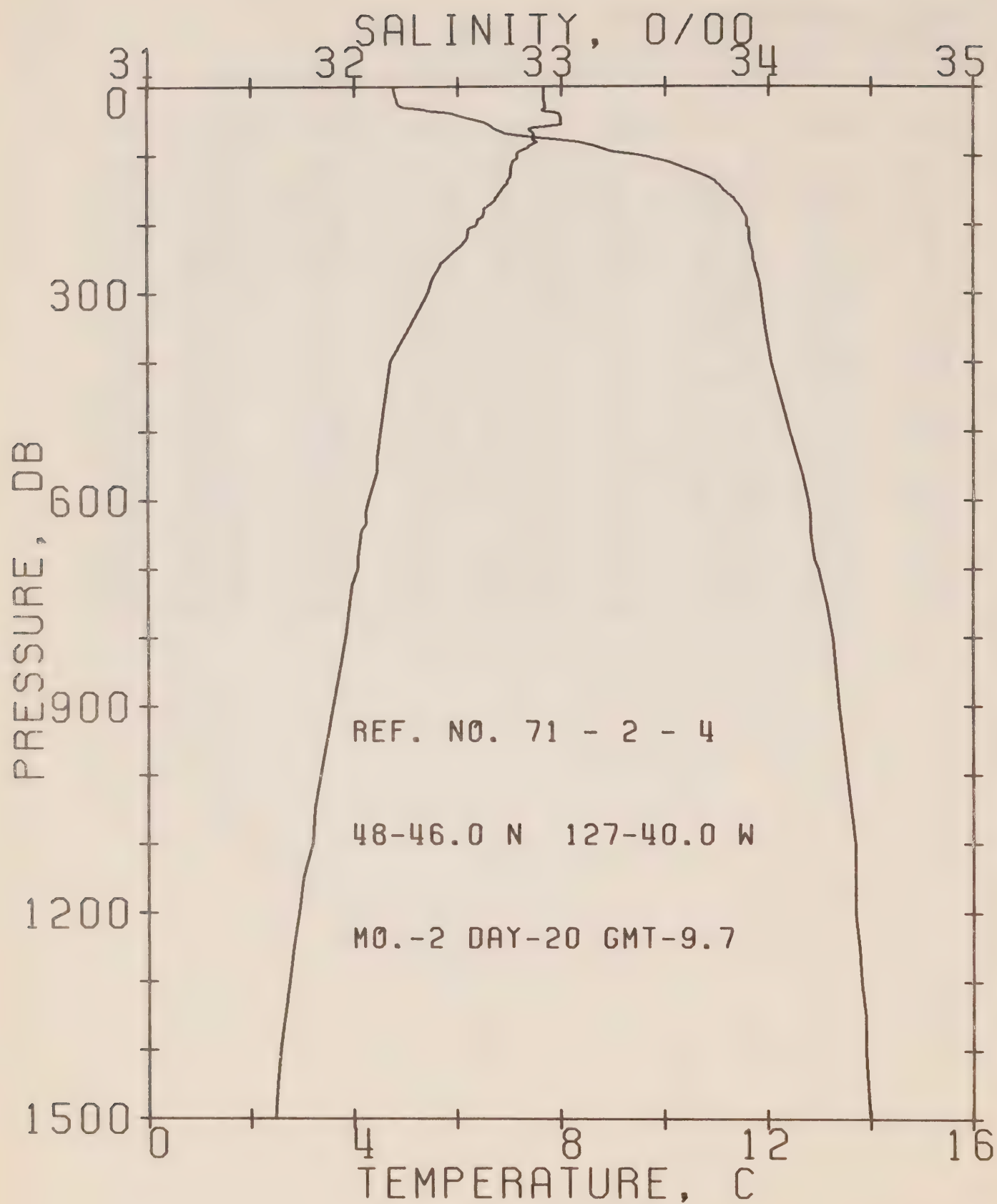
REFERENCE NO. 71- 2- 3

DATE 20/ 2/71

POSITION 48-42.0N, 126-40.0W GMT 5.4

RESULTS OF STP CAST 106 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.66	31.99	0	24.99	298.1	0.0	0.0	1478.
10	7.72	32.01	10	24.99	297.7	0.30	0.02	1478.
20	7.76	32.09	20	25.05	292.4	0.59	0.06	1479.
30	7.93	32.38	30	25.25	273.4	0.88	0.13	1480.
50	7.64	32.45	50	25.35	264.4	1.41	0.35	1479.
75	7.98	32.68	75	25.48	252.5	2.07	0.77	1481.
100	7.46	33.36	99	26.09	195.0	2.62	1.26	1480.
125	7.07	33.61	124	26.34	171.7	3.07	1.77	1480.
150	6.99	33.79	149	26.49	157.5	3.48	2.35	1480.
175	6.69	33.85	174	26.58	149.4	3.87	2.98	1479.
200	6.59	33.91	199	26.64	143.8	4.23	3.68	1479.
225	6.31	33.94	223	26.70	138.2	4.59	4.45	1479.
250	6.16	33.97	248	26.74	134.6	4.93	5.27	1478.
300	5.65	33.98	298	26.81	128.1	5.58	7.10	1477.
400	5.04	34.05	397	26.94	116.7	6.79	11.43	1476.
500	4.63	34.10	496	27.03	109.2	7.92	16.58	1476.
600	4.36	34.21	595	27.14	98.9	8.96	22.39	1477.
800	3.90	34.31	793	27.27	87.9	10.83	35.72	1479.
1000	3.43	34.39	991	27.38	78.3	12.49	50.85	1480.
1200	3.05	34.44	1188	27.46	71.5	13.97	67.52	1482.





PACIFIC OCEANOGRAPHIC GROUP

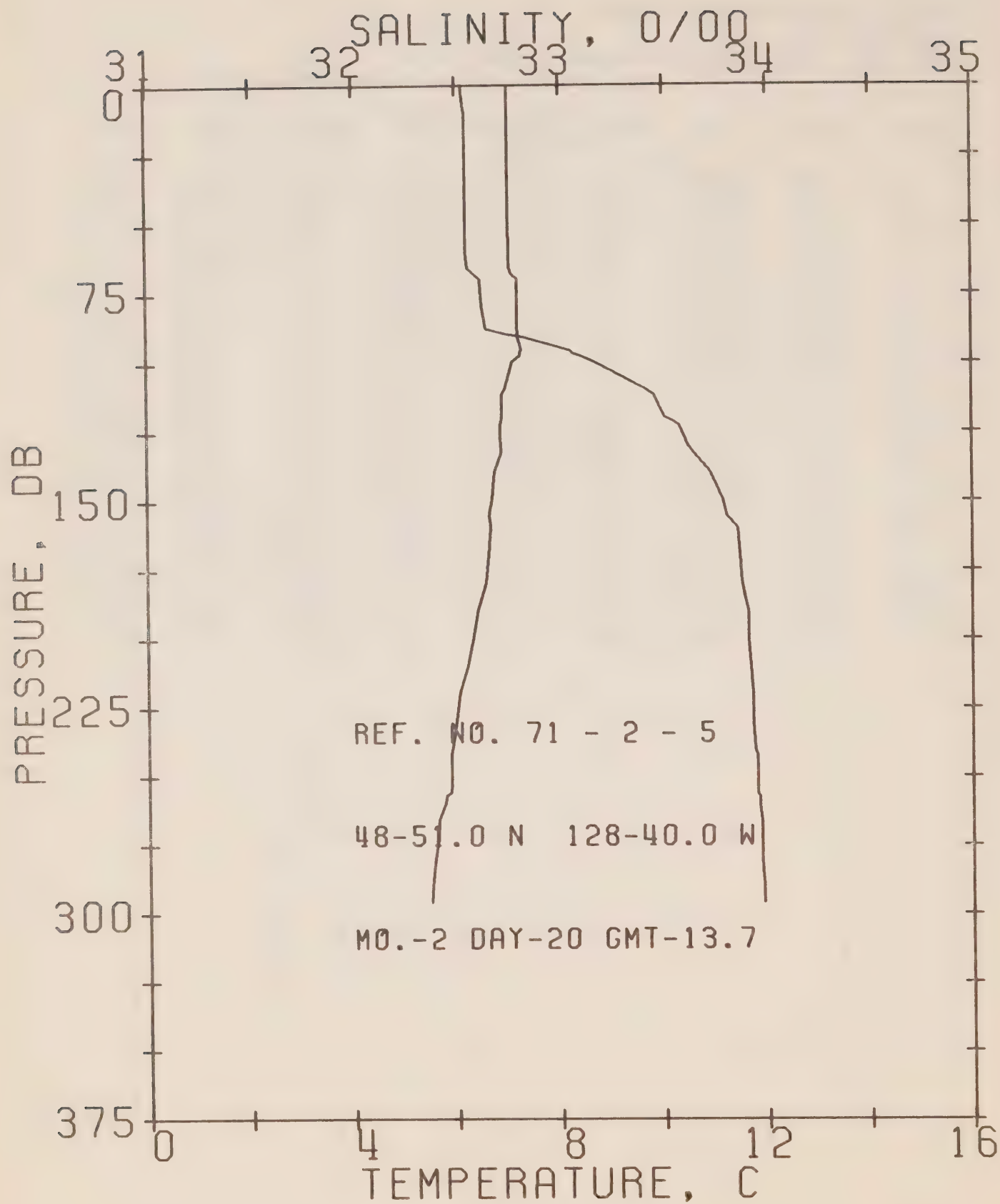
REFERENCE NO. 71- 2- 4

DATE 20/ 2/71

POSITION 48-46.0N, 127-40.0W GMT 9.7

RESULTS OF STP CAST 86 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.66	32.19	0	25.14	283.1	0.0	0.0	1478.
10	7.66	32.20	10	25.15	282.7	0.28	0.01	1478.
20	7.67	32.21	20	25.16	282.2	0.57	0.06	1478.
30	7.69	32.25	30	25.19	279.6	0.85	0.13	1479.
50	8.02	32.62	50	25.43	257.2	1.38	0.35	1481.
75	7.48	32.93	75	25.75	226.8	1.99	0.73	1479.
100	7.17	33.39	99	26.15	188.8	2.51	1.19	1479.
125	7.05	33.66	124	26.39	167.1	2.95	1.70	1480.
150	6.88	33.79	149	26.51	155.9	3.35	2.26	1479.
175	6.58	33.87	174	26.61	146.2	3.73	2.89	1479.
200	6.40	33.90	199	26.66	142.1	4.09	3.57	1478.
225	6.16	33.91	223	26.70	138.4	4.44	4.33	1478.
250	5.81	33.93	248	26.76	133.2	4.78	5.15	1477.
300	5.45	33.97	298	26.83	126.5	5.42	6.96	1476.
400	4.72	34.02	397	26.96	115.3	6.63	11.26	1475.
500	4.53	34.11	496	27.05	107.3	7.75	16.35	1476.
600	4.31	34.20	595	27.14	99.1	8.78	22.13	1477.
800	3.85	34.32	793	27.29	86.7	10.64	35.39	1478.
1000	3.38	34.39	991	27.39	77.7	12.29	50.45	1480.
1200	2.95	34.43	1188	27.46	71.1	13.76	66.95	1481.
1500	2.46	34.50	1484	27.56	62.1	15.74	94.07	1484.



PACIFIC OCEANOGRAPHIC GROUP

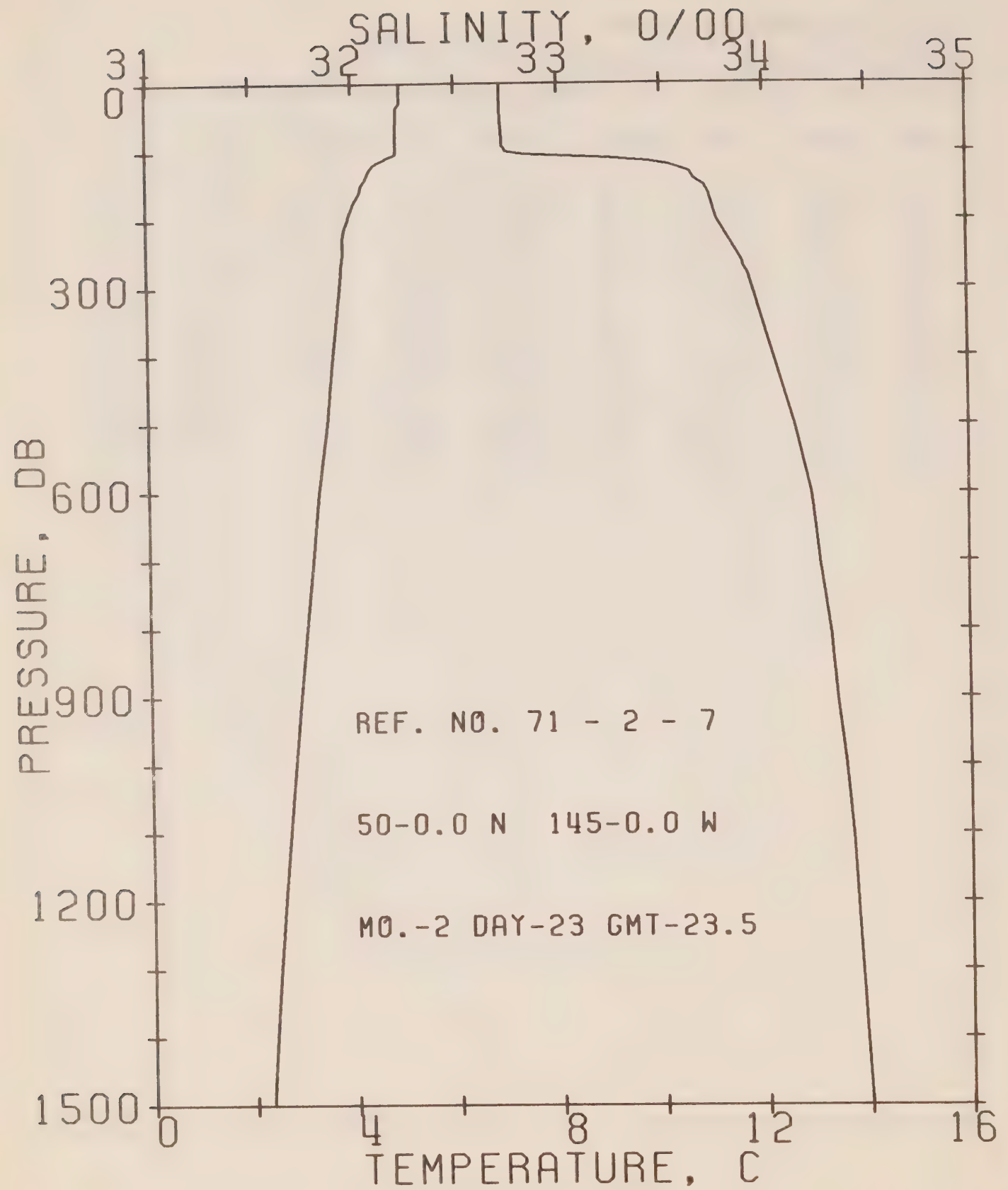
REFERENCE NO. 71- 2- 5

DATE 20/ 2/71

POSITION 48-51.0N, 128-40.0W GMT 13.7

RESULTS OF STP CAST 48 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.02	32.53	0	25.50	249.4	0.0	0.0	1476.
10	7.02	32.55	10	25.51	248.2	0.25	0.01	1476.
20	7.02	32.55	20	25.51	248.4	0.50	0.05	1476.
30	7.02	32.55	30	25.51	248.5	0.75	0.11	1476.
50	7.02	32.55	50	25.51	248.8	1.24	0.32	1477.
75	7.18	32.62	75	25.55	245.7	1.86	0.71	1478.
100	7.10	33.17	99	25.99	204.3	2.45	1.23	1479.
125	6.85	33.59	124	26.35	169.9	2.91	1.76	1479.
150	6.69	33.79	149	26.53	153.4	3.31	2.32	1479.
175	6.60	33.87	174	26.61	146.3	3.68	2.94	1479.
200	6.32	33.91	199	26.68	140.4	4.04	3.62	1478.
225	6.02	33.93	223	26.73	135.5	4.39	4.37	1477.
250	5.88	33.95	248	26.76	132.6	4.72	5.18	1477.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 7

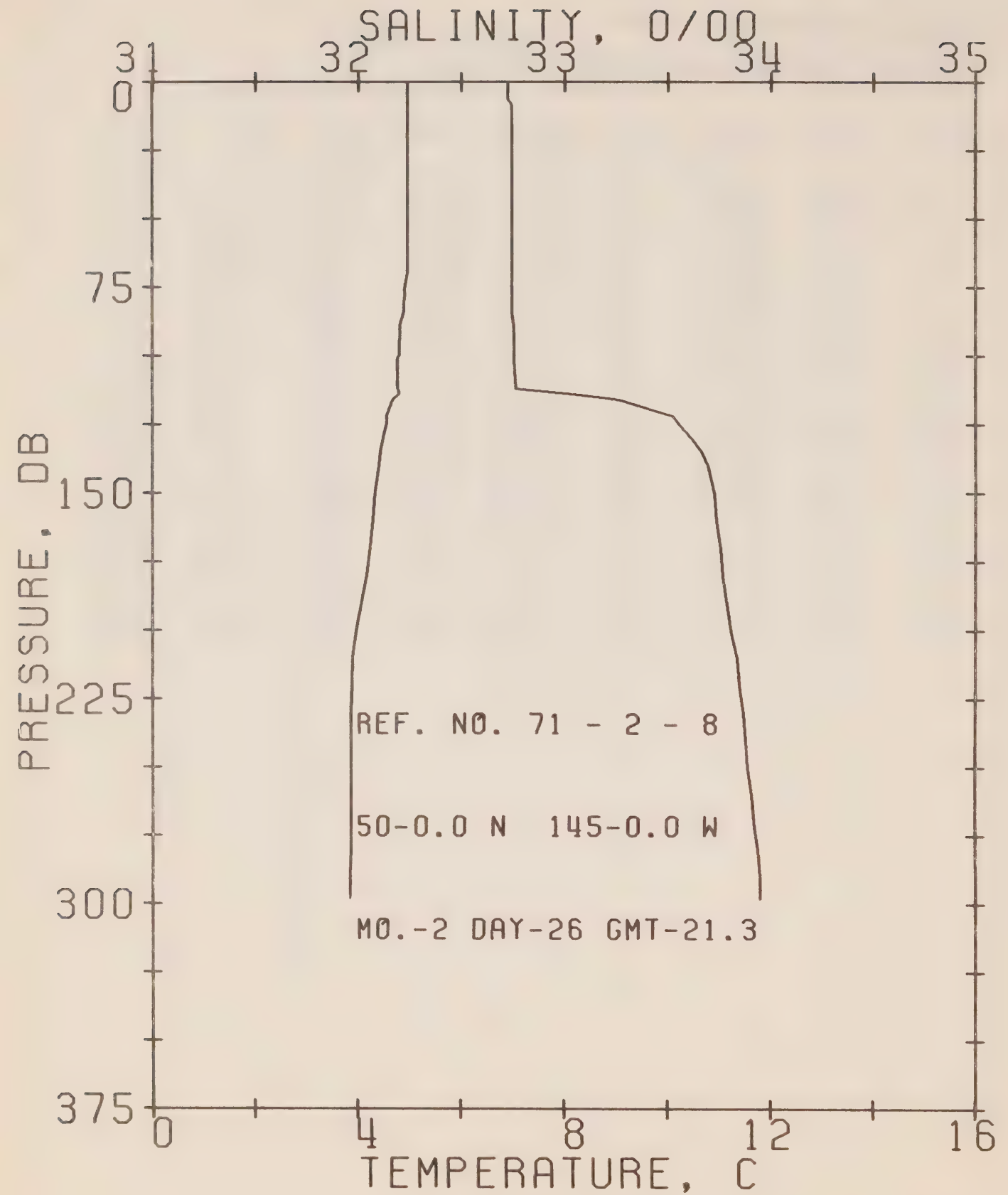
DATE 23/ 2/71

POSITION 50- 0.0N, 145- 0.0W GMT 23.5

RESULTS OF STP CAST 46 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.98	32.73	0	25.91	210.6	0.0	0.0	1468.
10	4.98	32.73	10	25.91	210.9	0.21	0.01	1468.
20	4.98	32.73	20	25.91	211.0	0.42	0.04	1468.
30	4.97	32.73	30	25.91	211.0	0.63	0.10	1468.
50	4.91	32.73	50	25.92	210.3	1.05	0.27	1468.
75	4.90	32.74	75	25.92	210.1	1.58	0.60	1469.
100	4.90	32.76	99	25.94	208.7	2.10	1.07	1469.
125	4.40	33.60	124	26.66	140.6	2.52	1.55	1469.
150	4.22	33.72	149	26.77	129.9	2.86	2.02	1469.
175	4.07	33.75	174	26.81	126.0	3.18	2.55	1468.
200	3.95	33.78	199	26.85	123.1	3.49	3.14	1468.
225	3.84	33.83	223	26.90	118.5	3.79	3.80	1468.
250	3.84	33.88	248	26.94	114.9	4.09	4.50	1469.
300	3.77	33.95	298	27.00	109.3	4.64	6.07	1469.
400	3.63	34.05	397	27.09	101.3	5.70	9.81	1471.
500	3.50	34.15	496	27.19	93.2	6.67	14.24	1472.
600	3.34	34.23	595	27.26	86.2	7.57	19.25	1473.
800	3.08	34.32	793	27.36	78.1	9.22	30.98	1475.
1000	2.83	34.39	990	27.44	71.5	10.72	44.71	1477.
1200	2.58	34.44	1188	27.50	66.2	12.09	60.10	1480.
1500	2.29	34.50	1483	27.57	60.2	13.99	86.14	1484.





PACIFIC OCEANOGRAPHIC GROUP

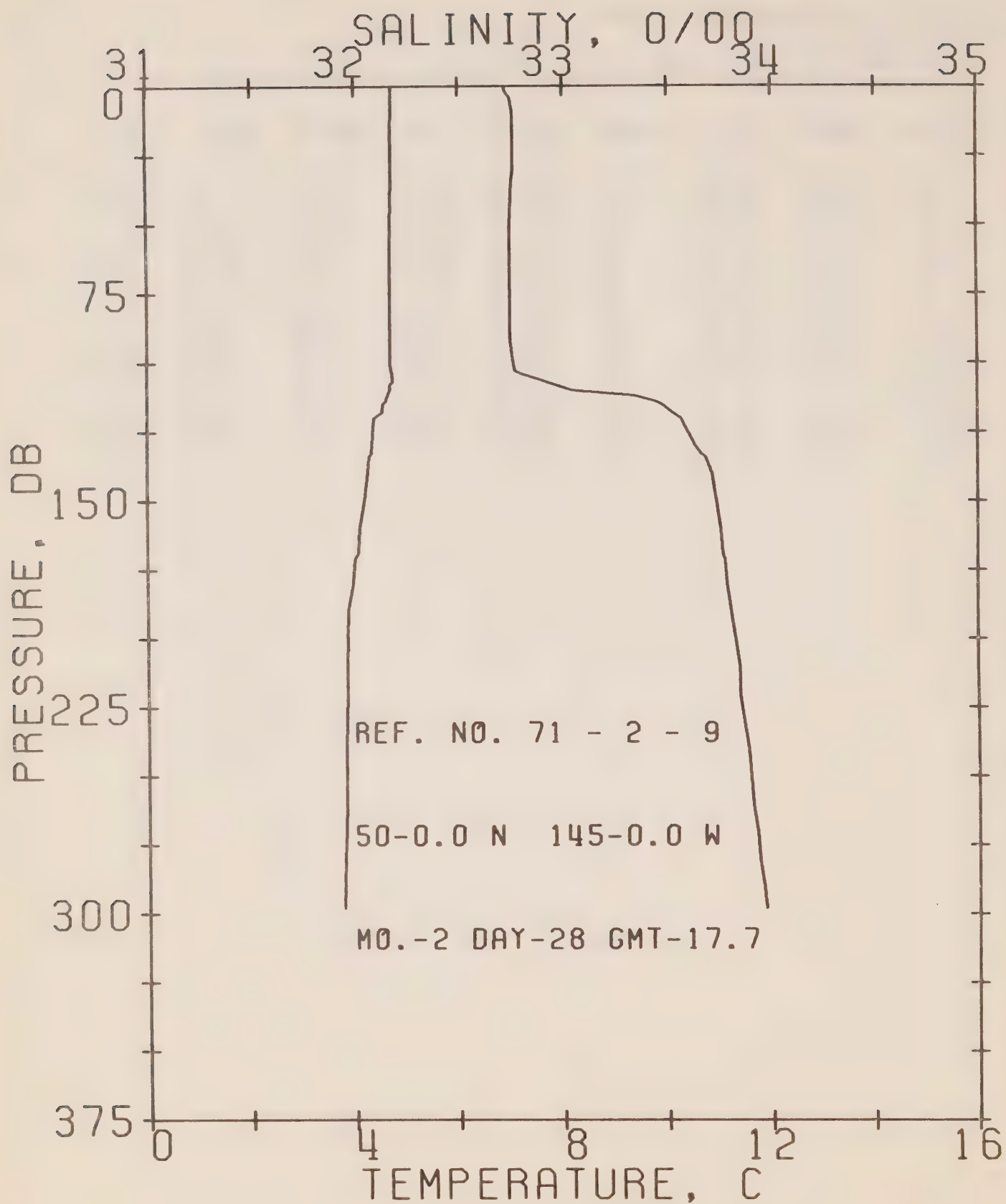
REFERENCE NO. 71- 2- 8

DATE 26/ 2/71

POSITION 50- 0.0N, 145- 0.0W GMT 21.3

RESULTS OF STP CAST 33 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.98	32.73	0	25.91	210.6	0.0	0.0	1468.
10	4.98	32.75	10	25.92	209.4	0.21	0.01	1468.
20	4.98	32.75	20	25.92	209.5	0.42	0.04	1468.
30	4.98	32.75	30	25.92	209.6	0.63	0.10	1468.
50	4.98	32.75	50	25.92	209.8	1.05	0.27	1469.
75	4.93	32.75	75	25.93	209.5	1.57	0.60	1469.
100	4.82	32.76	99	25.95	207.8	2.09	1.07	1469.
125	4.58	33.56	124	26.61	145.5	2.56	1.59	1469.
150	4.35	33.73	149	26.77	130.5	2.90	2.07	1469.
175	4.22	33.76	174	26.81	126.8	3.22	2.60	1469.
200	3.97	33.81	199	26.87	121.1	3.53	3.19	1468.
225	3.87	33.86	223	26.92	116.5	3.82	3.83	1468.
250	3.86	33.89	248	26.94	114.4	4.11	4.53	1469.



PACIFIC OCEANOGRAPHIC GROUP

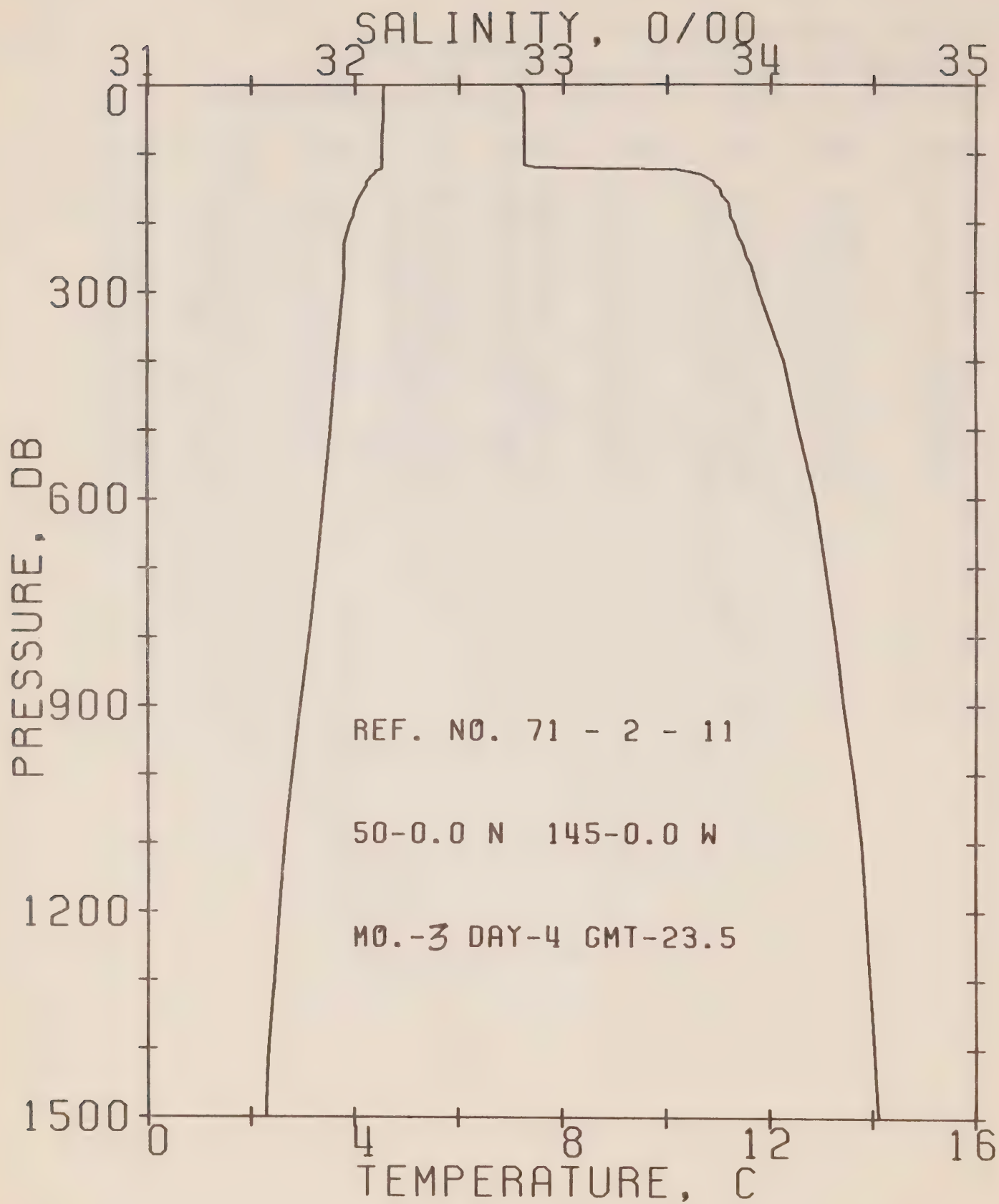
REFERENCE NO. 71- 2- 9

DATE 28/ 2/71

POSITION 50- 0.0N, 145- 0.0W GMT 17.7

RESULTS OF STP CAST 43 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.75	32.73	0	25.93	208.3	0.0	0.0	1467.
10	4.75	32.77	10	25.96	205.5	0.21	0.01	1467.
20	4.73	32.77	20	25.96	205.4	0.41	0.04	1467.
30	4.73	32.77	30	25.96	205.5	0.62	0.09	1467.
50	4.71	32.75	50	25.95	207.0	1.03	0.26	1468.
75	4.70	32.75	75	25.95	207.0	1.55	0.59	1468.
100	4.70	32.77	99	25.97	205.8	2.06	1.05	1468.
125	4.37	33.60	124	26.66	139.9	2.49	1.54	1469.
150	4.20	33.74	149	26.79	128.2	2.82	2.00	1468.
175	4.00	33.78	174	26.85	123.0	3.14	2.52	1468.
200	3.85	33.83	199	26.90	118.4	3.44	3.10	1468.
225	3.83	33.86	223	26.92	116.2	3.73	3.73	1468.
250	3.81	33.90	248	26.96	113.1	4.02	4.42	1469.





PACIFIC OCEANOGRAPHIC GROUP

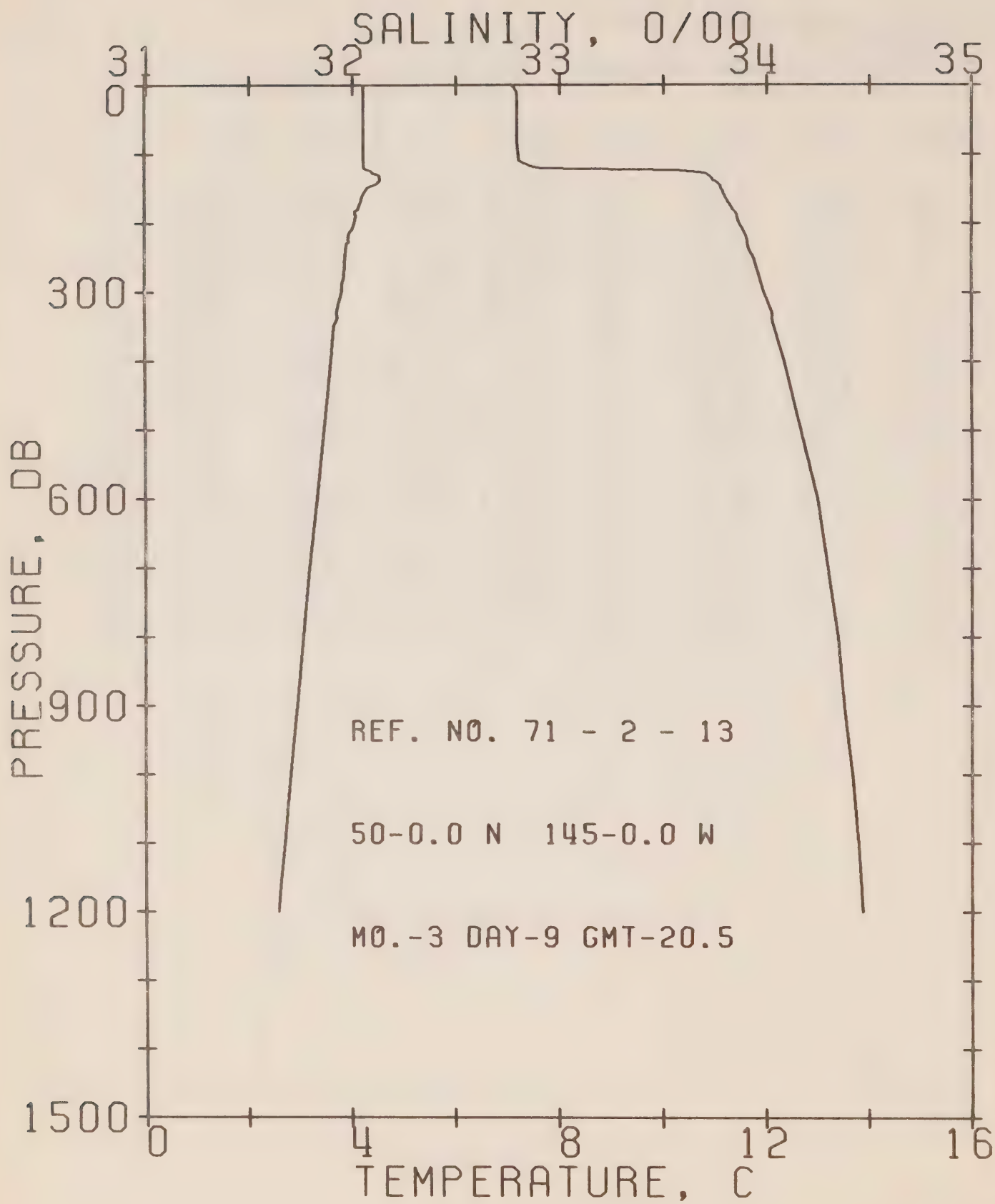
REFERENCE NO. 71- 2- 11

DATE 4/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 23.5

RESULTS OF STP CAST 48 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.59	32.79	0	25.99	202.1	0.0	0.0	1466.
10	4.58	32.82	10	26.02	200.1	0.20	0.01	1467.
20	4.58	32.82	20	26.02	200.1	0.40	0.04	1467.
30	4.57	32.82	30	26.02	200.1	0.60	0.09	1467.
50	4.57	32.82	50	26.02	200.3	1.00	0.26	1467.
75	4.55	32.82	74	26.02	200.3	1.50	0.57	1467.
100	4.54	32.82	99	26.02	200.3	2.00	1.02	1468.
125	4.43	33.58	124	26.64	142.1	2.48	1.57	1469.
150	4.22	33.76	149	26.80	127.0	2.81	2.03	1469.
175	4.03	33.80	174	26.86	121.9	3.13	2.55	1468.
200	3.94	33.83	199	26.89	119.2	3.43	3.12	1468.
225	3.84	33.86	223	26.92	116.2	3.72	3.76	1468.
250	3.81	33.89	248	26.95	113.9	4.01	4.46	1469.
300	3.79	33.95	298	27.00	109.6	4.57	6.02	1469.
400	3.66	34.07	397	27.11	100.0	5.62	9.73	1471.
500	3.55	34.14	496	27.17	94.4	6.59	14.18	1472.
600	3.41	34.22	595	27.25	87.7	7.50	19.27	1473.
800	3.13	34.32	793	27.36	78.7	9.16	31.10	1475.
1000	2.80	34.41	990	27.46	69.8	10.65	44.71	1477.
1200	2.54	34.47	1188	27.53	63.6	11.98	59.53	1480.
1500	2.27	34.53	1483	27.60	57.7	13.79	84.50	1483.



PACIFIC OCEANOGRAPHIC GROUP

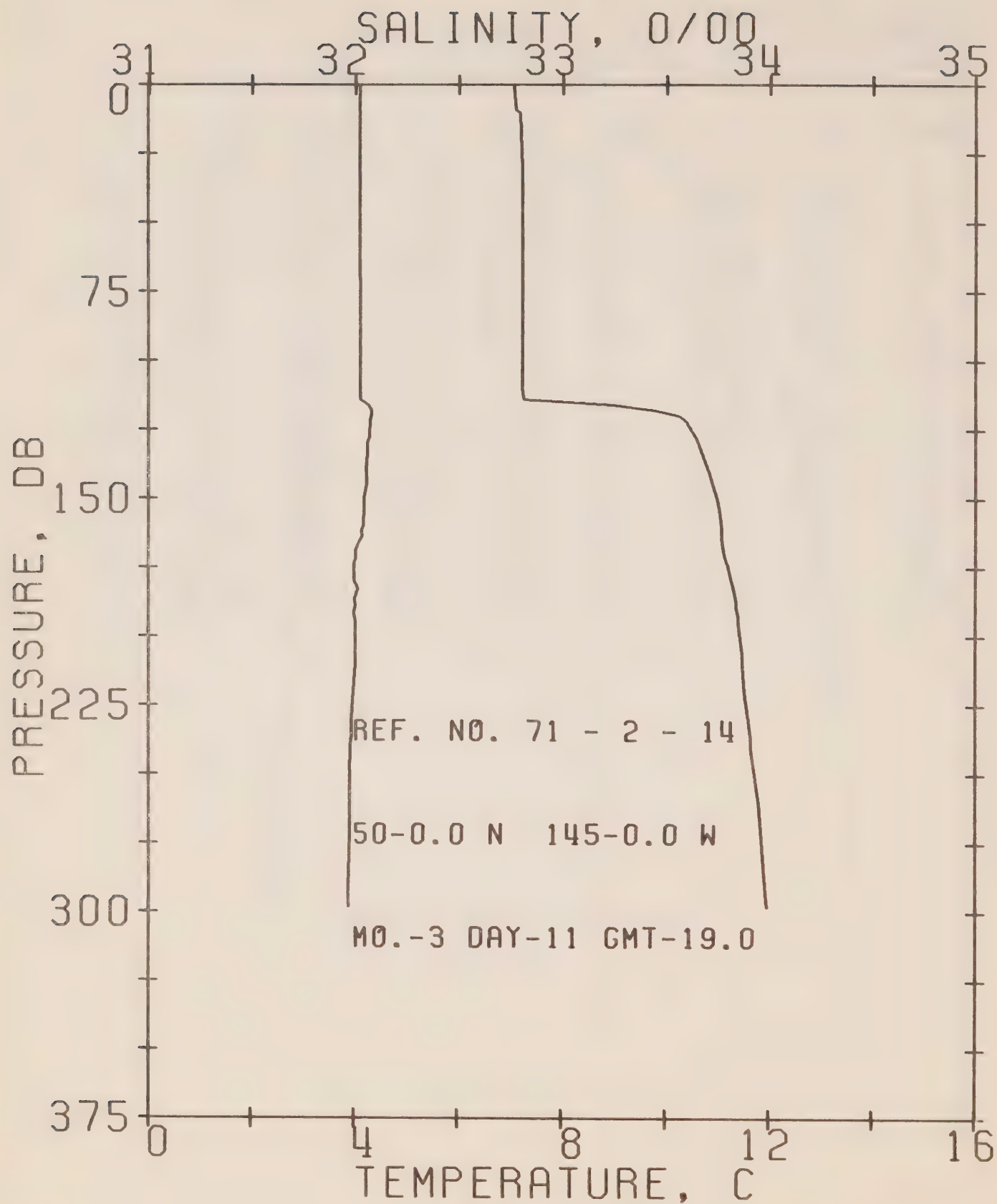
REFERENCE NO. 71- 2- 13

DATE 9/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 20.5

RESULTS OF STP CAST 50 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.21	32.77	0	26.02	199.9	0.0	0.0	1465.
10	4.21	32.80	10	26.04	197.9	0.20	0.01	1465.
20	4.21	32.80	20	26.04	198.0	0.40	0.04	1465.
30	4.21	32.80	30	26.04	198.0	0.59	0.09	1465.
50	4.21	32.80	50	26.04	198.2	0.99	0.25	1466.
75	4.21	32.80	74	26.04	198.4	1.49	0.57	1466.
100	4.22	32.81	99	26.05	198.1	1.98	1.01	1466.
125	4.37	33.60	124	26.66	139.9	2.46	1.55	1469.
150	4.31	33.78	149	26.81	126.0	2.79	2.01	1469.
175	4.15	33.83	174	26.87	121.2	3.09	2.52	1469.
200	4.06	33.87	199	26.91	117.5	3.39	3.09	1469.
225	3.94	33.91	223	26.95	113.5	3.68	3.72	1469.
250	3.88	33.94	248	26.98	110.8	3.96	4.40	1469.
300	3.81	33.99	298	27.03	106.7	4.51	5.92	1470.
400	3.60	34.09	397	27.13	97.9	5.52	9.55	1470.
500	3.47	34.17	496	27.20	91.3	6.47	13.87	1472.
600	3.34	34.25	595	27.28	84.7	7.35	18.79	1473.
800	3.07	34.35	793	27.38	75.8	8.96	30.19	1475.
1000	2.81	34.42	990	27.46	69.1	10.41	43.50	1477.
1200	2.55	34.47	1188	27.53	63.8	11.74	58.34	1480.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 14

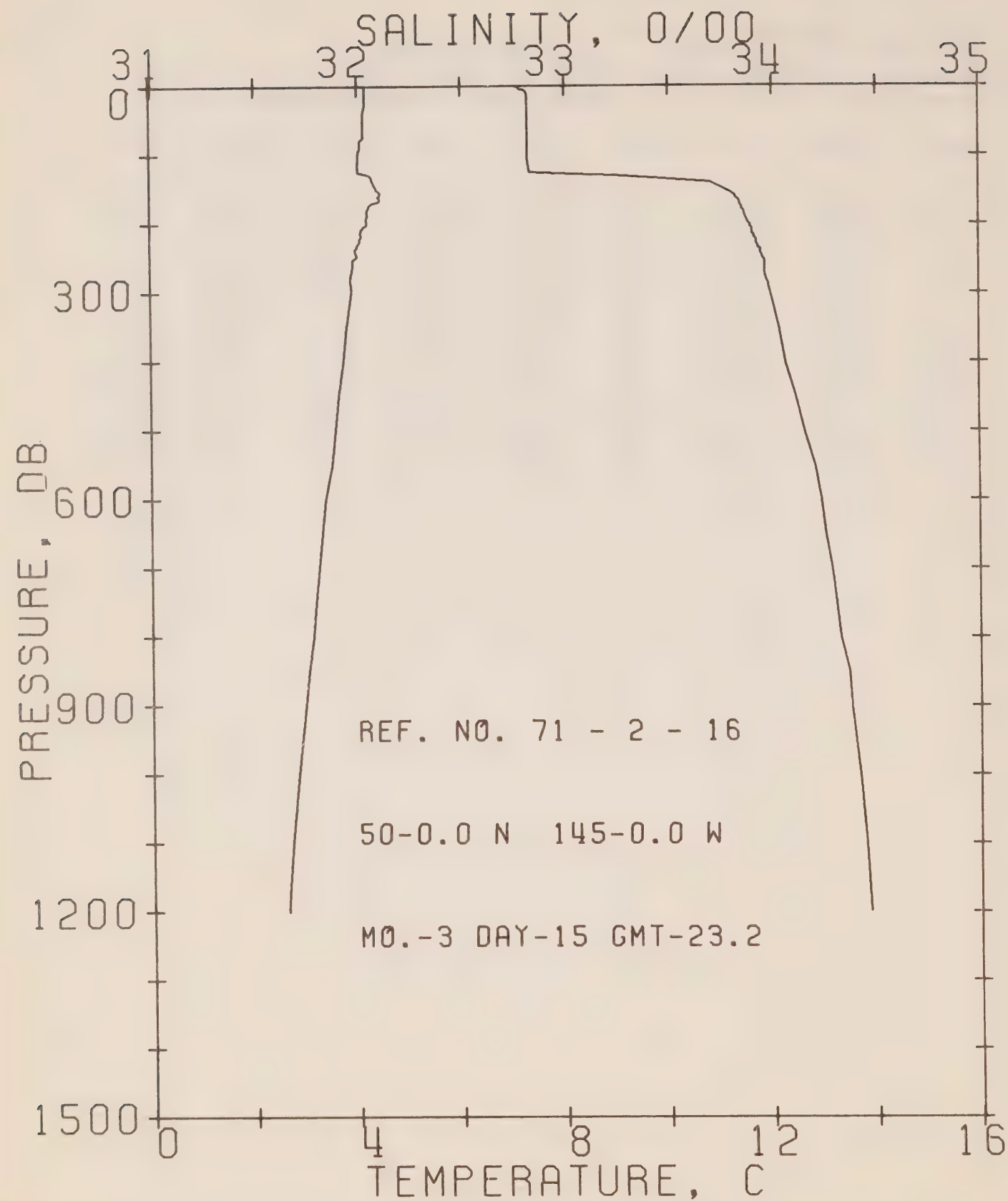
DATE 11/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 19.0

RESULTS OF STP CAST 41 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.09	32.77	0	26.03	198.7	0.0	0.0	1464.
10	4.08	32.80	10	26.06	196.6	0.20	0.01	1464.
20	4.08	32.80	20	26.06	196.3	0.39	0.04	1465.
30	4.08	32.81	30	26.06	196.0	0.59	0.09	1465.
50	4.08	32.81	50	26.06	196.2	0.98	0.25	1465.
75	4.09	32.81	74	26.06	196.4	1.47	0.56	1465.
100	4.09	32.81	99	26.06	196.6	1.97	1.00	1466.
125	4.30	33.62	124	26.69	137.7	2.41	1.50	1468.
150	4.19	33.75	149	26.80	127.4	2.74	1.97	1468.
175	3.98	33.80	174	26.86	121.5	3.05	2.48	1468.
200	4.02	33.86	199	26.90	117.8	3.35	3.05	1469.
225	3.95	33.89	223	26.93	115.1	3.64	3.68	1469.
250	3.90	33.93	248	26.97	111.8	3.92	4.37	1469.





PACIFIC OCEANOGRAPHIC GROUP

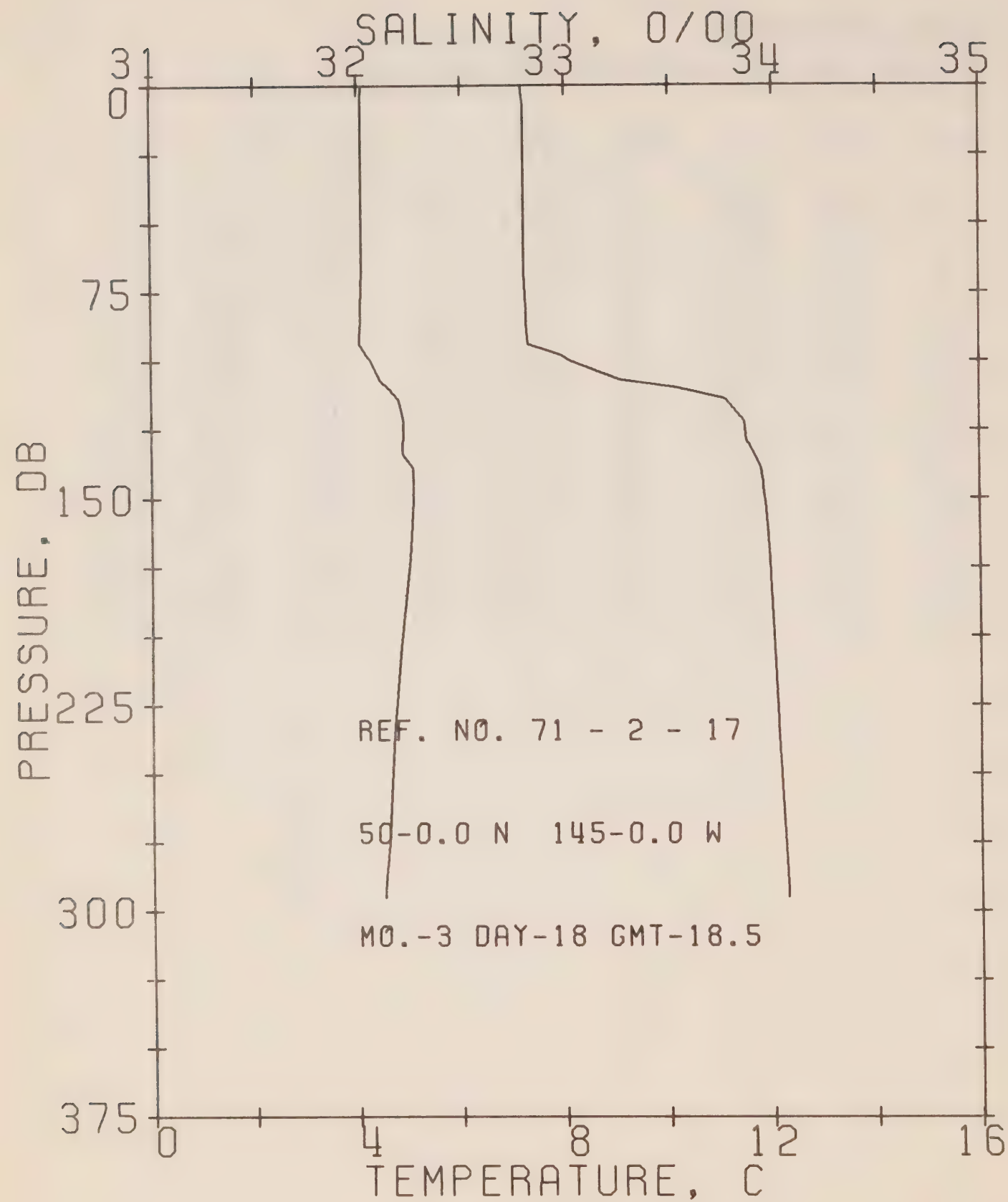
REFERENCE NO. 71- 2- 16

DATE 15/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 23.2

RESULTS OF STP CAST 72 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.17	32.77	0	26.02	199.5	0.0	0.0	1465.
10	4.17	32.83	10	26.07	195.3	0.20	0.01	1465.
20	4.17	32.83	20	26.07	195.3	0.39	0.04	1465.
30	4.17	32.83	30	26.07	195.4	0.59	0.09	1465.
50	4.13	32.83	50	26.07	195.2	0.98	0.25	1465.
75	4.13	32.83	74	26.07	195.4	1.47	0.56	1466.
100	4.03	32.83	99	26.08	194.5	1.95	0.99	1466.
125	4.02	32.84	124	26.09	193.9	2.44	1.55	1466.
150	4.38	33.78	149	26.80	127.1	2.81	2.06	1469.
175	4.25	33.86	174	26.88	120.0	3.12	2.57	1469.
200	4.20	33.90	199	26.92	116.7	3.41	3.14	1469.
225	4.06	33.93	223	26.95	113.2	3.70	3.76	1469.
250	3.97	33.96	248	26.99	110.0	3.98	4.44	1469.
300	3.91	34.00	298	27.03	107.0	4.52	5.95	1470.
400	3.75	34.07	397	27.10	100.9	5.56	9.65	1471.
500	3.59	34.16	496	27.18	93.4	6.53	14.08	1472.
600	3.39	34.24	595	27.27	86.1	7.42	19.09	1473.
800	3.13	34.33	793	27.36	78.0	9.06	30.74	1475.
1000	2.83	34.42	990	27.46	69.3	10.52	44.12	1477.
1200	2.58	34.47	1188	27.52	64.0	11.85	59.00	1480.



PACIFIC OCEANOGRAPHIC GROUP

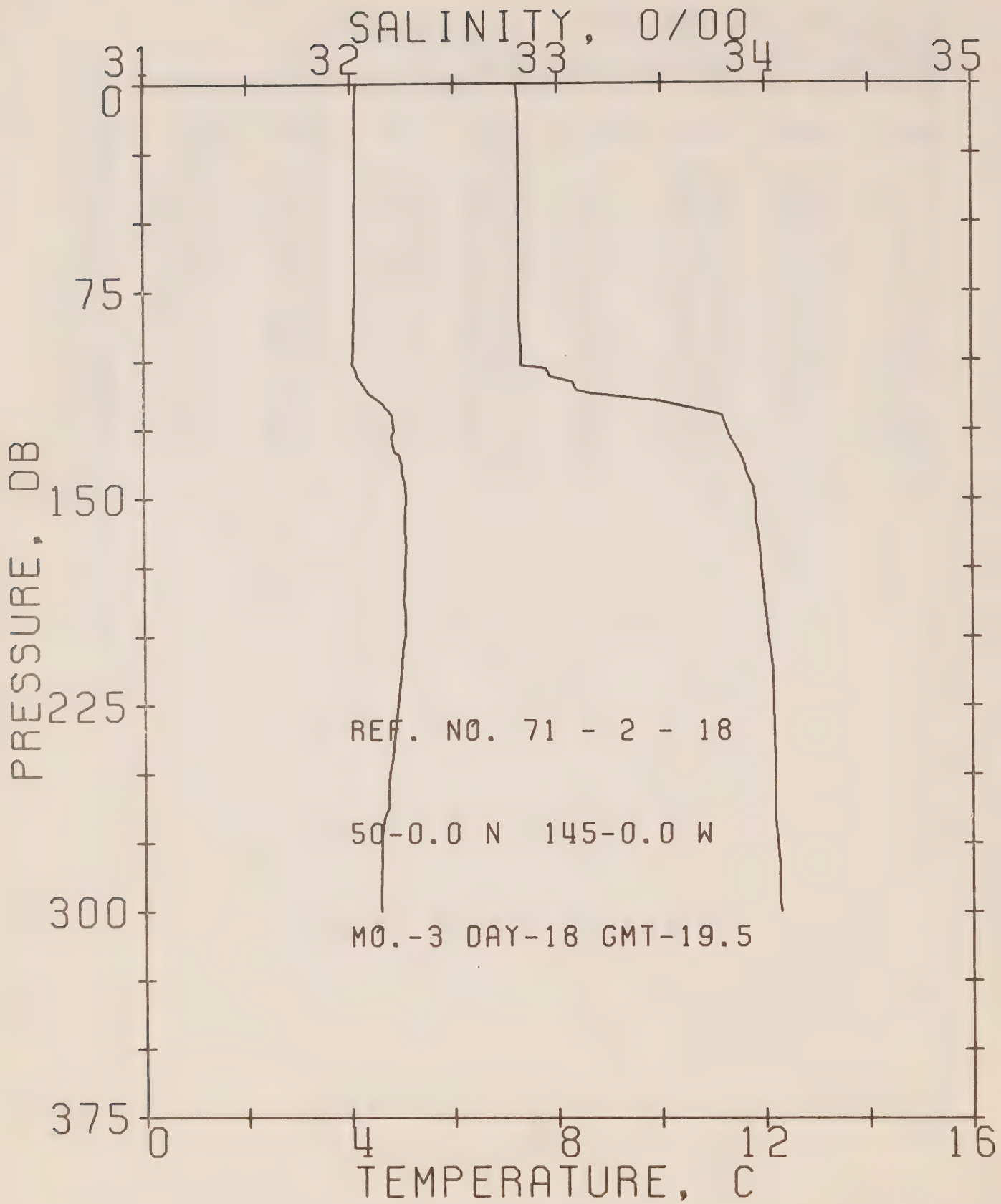
REFERENCE NO. 71- 2- 17

DATE 18/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 18.5

RESULTS OF STP CAST 26 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.11	32.80	0	26.05	196.7	0.0	0.0	1464.
10	4.10	32.81	10	26.06	196.1	0.20	0.01	1464.
20	4.10	32.81	20	26.06	196.1	0.39	0.04	1465.
30	4.10	32.81	30	26.06	196.2	0.59	0.09	1465.
50	4.09	32.81	50	26.06	196.3	0.98	0.25	1465.
75	4.08	32.82	74	26.07	195.9	1.47	0.56	1465.
100	4.24	33.03	99	26.22	181.6	1.95	0.99	1467.
125	4.90	33.87	124	26.82	125.3	2.32	1.41	1471.
150	5.09	33.97	149	26.87	120.8	2.62	1.84	1472.
175	5.01	33.99	174	26.90	118.3	2.92	2.33	1473.
200	4.86	34.01	199	26.93	115.7	3.22	2.89	1472.
225	4.74	34.02	223	26.96	113.5	3.50	3.51	1472.
250	4.65	34.04	248	26.98	111.4	3.78	4.19	1472.





PACIFIC OCEANOGRAPHIC GROUP

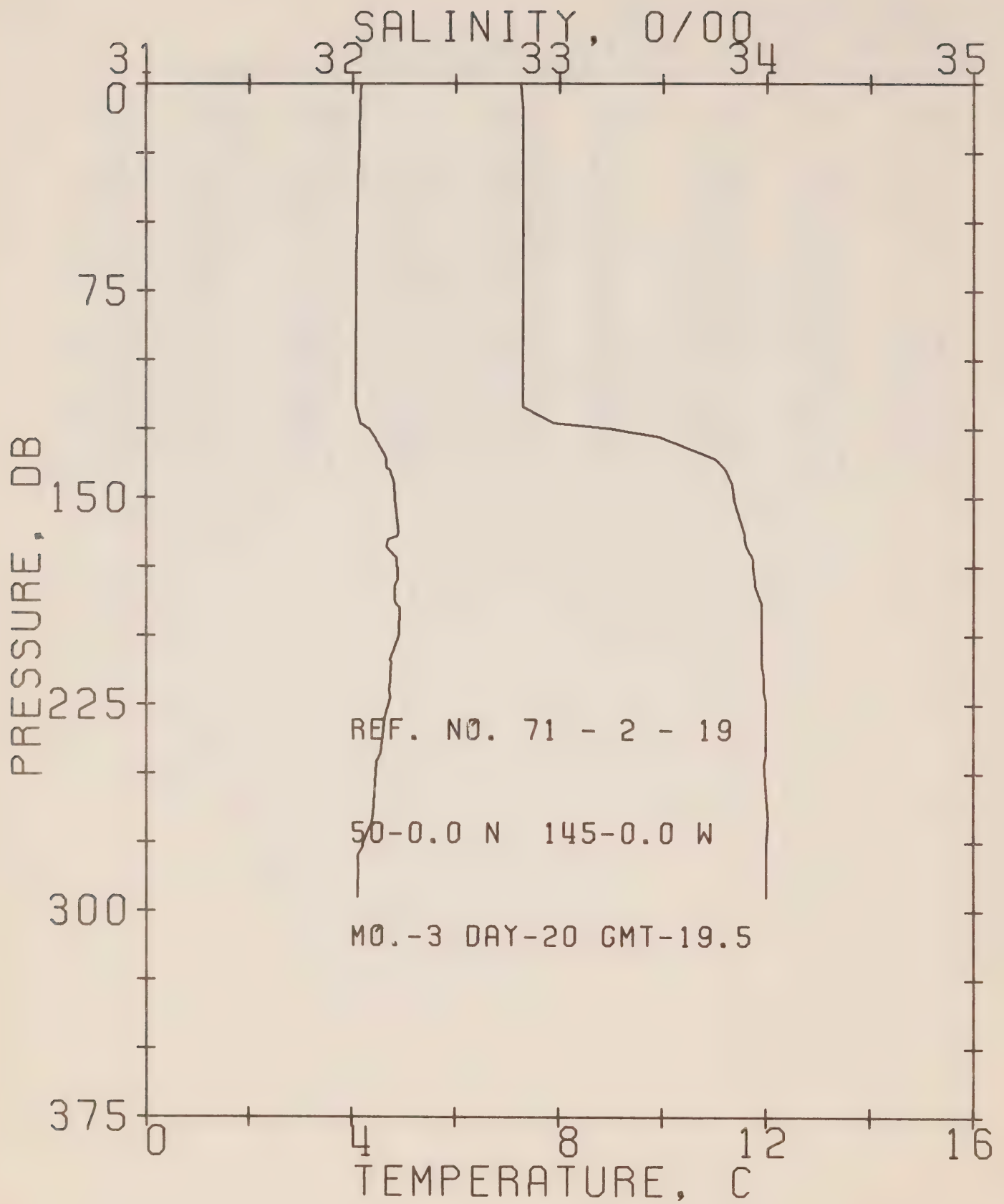
REFERENCE NO. 71- 2- 18

DATE 18/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 19.5

RESULTS OF STP CAST 44 POINTS TAKEN FROM ANALCG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.14	32.81	0	26.06	196.1	0.0	0.0	1465.
10	4.11	32.82	10	26.07	195.4	0.20	0.01	1465.
20	4.11	32.82	20	26.07	195.5	0.39	0.04	1465.
30	4.11	32.82	30	26.07	195.6	0.59	0.09	1465.
50	4.10	32.82	50	26.07	195.6	0.98	0.25	1465.
75	4.10	32.82	74	26.07	195.8	1.47	0.56	1466.
100	4.04	32.83	99	26.08	194.6	1.96	1.00	1466.
125	4.83	33.82	124	26.79	128.3	2.36	1.45	1471.
150	5.08	33.96	149	26.87	121.3	2.67	1.89	1472.
175	5.06	33.99	174	26.89	119.3	2.97	2.39	1473.
200	5.06	34.02	199	26.92	117.0	3.26	2.95	1473.
225	4.92	34.04	223	26.95	114.0	3.55	3.57	1473.
250	4.75	34.05	248	26.98	111.9	3.83	4.26	1473.
300	4.54	34.08	298	27.02	107.7	4.38	5.79	1473.



PACIFIC OCEANOGRAPHIC GROUP

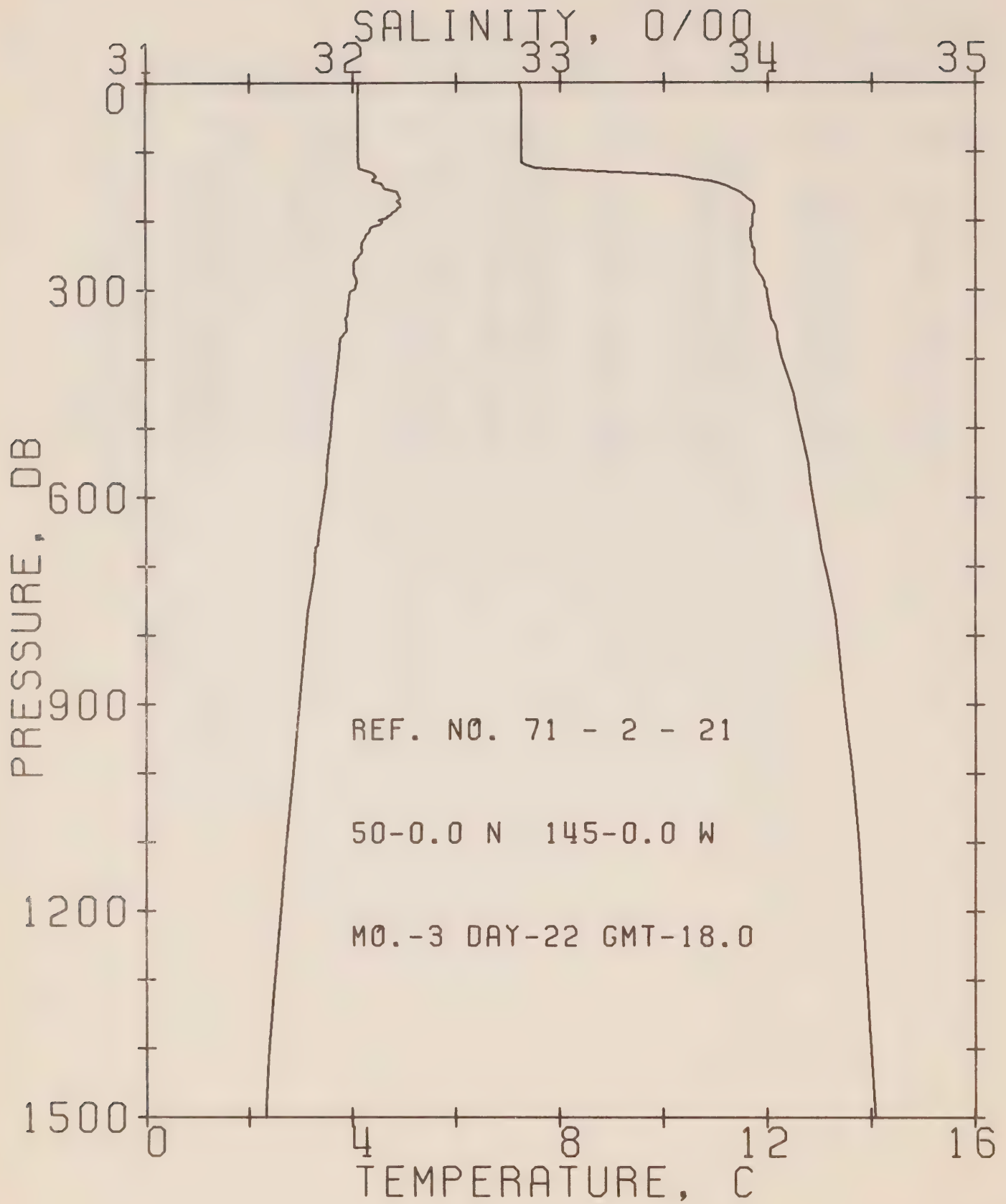
REFERENCE NO. 71- 2- 19

DATE 20/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 19.5

RESULTS OF STP CAST 45 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.18	32.82	0	26.06	195.8	0.0	0.0	1465.
10	4.16	32.83	10	26.07	195.2	0.20	0.01	1465.
20	4.14	32.83	20	26.07	195.1	0.39	0.04	1465.
30	4.13	32.83	30	26.07	195.0	0.59	0.09	1465.
50	4.09	32.83	50	26.08	194.8	0.98	0.25	1465.
75	4.06	32.83	74	26.08	194.6	1.46	0.56	1465.
100	4.05	32.83	99	26.08	194.8	1.95	0.99	1466.
125	4.31	33.25	124	26.39	166.0	2.43	1.54	1468.
150	4.83	33.85	149	26.81	126.7	2.77	2.01	1471.
175	4.86	33.94	174	26.88	120.5	3.08	2.53	1472.
200	4.92	33.98	199	26.90	118.5	3.37	3.09	1473.
225	4.71	34.00	223	26.94	114.9	3.66	3.72	1472.
250	4.47	33.99	248	26.96	113.0	3.95	4.41	1472.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 21

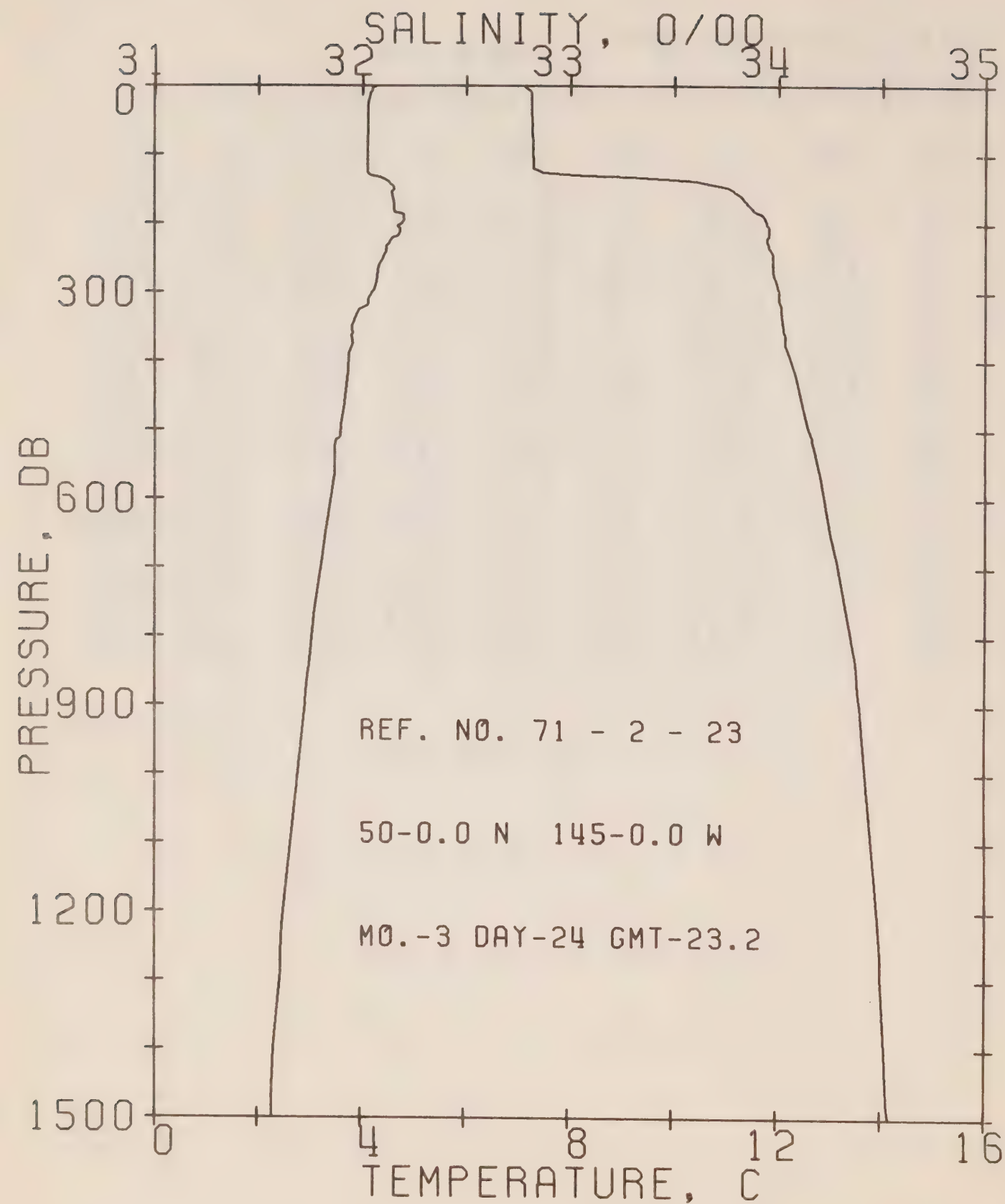
DATE 22/ 3/71

POSITION 50- 0.0N. 145- 0.0W GMT 18.0

RESULTS OF STP CAST 81 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.16	32.81	0	26.06	196.3	0.0	0.0	1465.
10	4.11	32.82	10	26.07	195.4	0.20	0.01	1465.
20	4.10	32.82	20	26.07	195.4	0.39	0.04	1465.
30	4.10	32.82	30	26.07	195.5	0.59	0.09	1465.
50	4.10	32.82	50	26.07	195.6	0.98	0.25	1465.
75	4.10	32.82	74	26.07	195.8	1.47	0.56	1466.
100	4.10	32.82	99	26.07	196.0	1.96	1.00	1466.
125	4.15	32.95	124	26.17	186.6	2.44	1.56	1467.
150	4.58	33.81	149	26.80	126.9	2.81	2.07	1470.
175	4.92	33.94	174	26.87	121.4	3.12	2.58	1472.
200	4.59	33.93	199	26.90	118.6	3.42	3.15	1471.
225	4.26	33.92	223	26.93	116.0	3.71	3.79	1470.
250	4.15	33.94	248	26.95	113.7	4.00	4.48	1470.
300	4.01	34.00	298	27.01	108.2	4.55	6.03	1470.
400	3.73	34.07	397	27.10	100.5	5.60	9.75	1471.
500	3.60	34.16	496	27.19	93.2	6.56	14.16	1472.
600	3.46	34.22	595	27.25	88.1	7.47	19.23	1473.
800	3.10	34.34	793	27.37	76.9	9.11	30.93	1475.
1000	2.85	34.41	990	27.45	70.3	10.59	44.44	1478.
1200	2.61	34.46	1188	27.51	65.1	11.94	59.54	1480.
1500	2.30	34.52	1483	27.59	58.8	13.79	84.99	1484.





PACIFIC OCEANOGRAPHIC GROUP

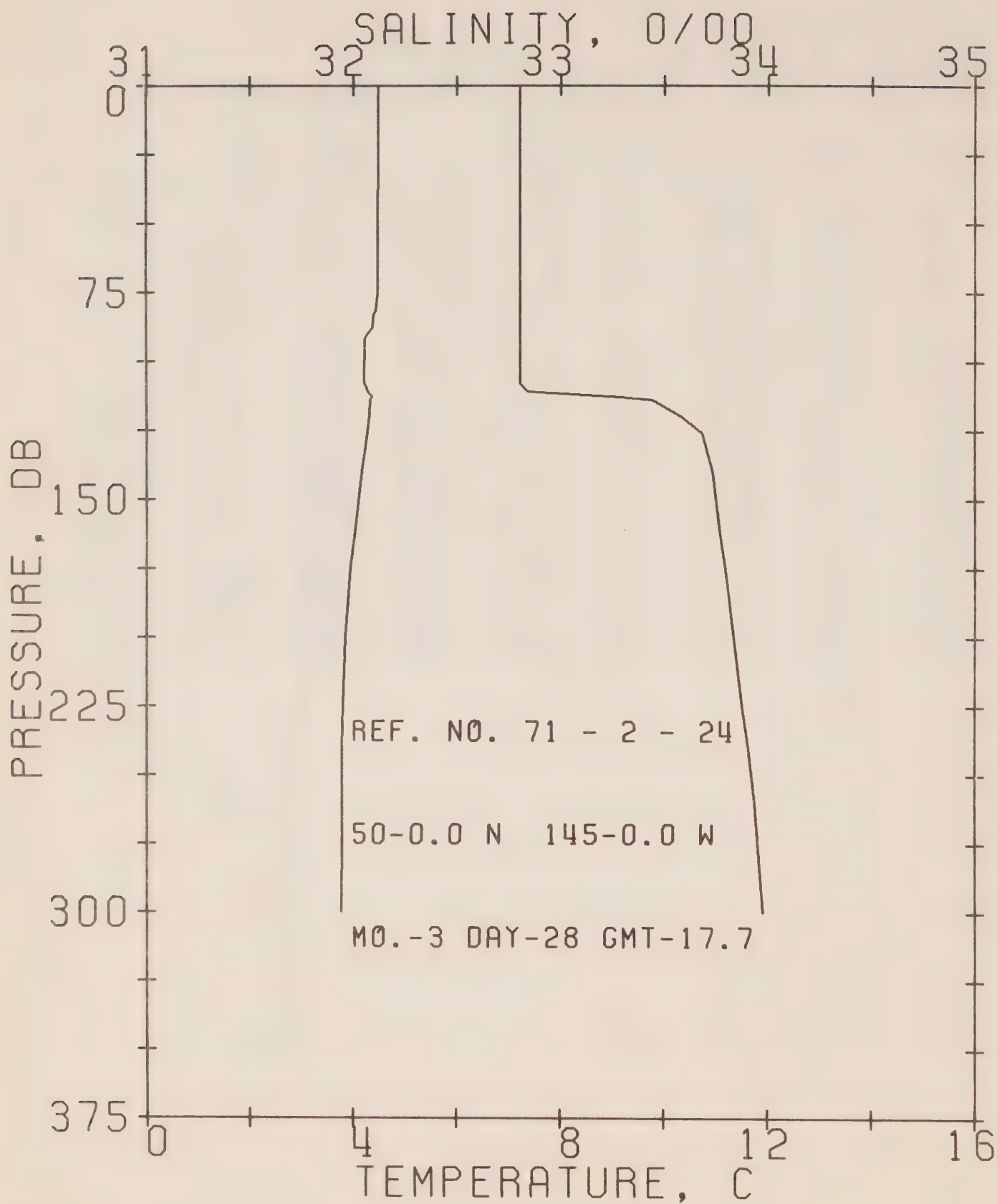
REFERENCE NO. 71- 2- 23

DATE 24/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 23.2

RESULTS OF STP CAST 68 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.30	32.79	0	26.03	199.2	0.0	0.0	1465.
10	4.17	32.82	10	26.06	196.0	0.20	0.01	1465.
20	4.14	32.82	20	26.07	195.8	0.39	0.04	1465.
30	4.11	32.82	30	26.07	195.6	0.59	0.09	1465.
50	4.11	32.82	50	26.07	195.5	0.98	0.25	1465.
75	4.10	32.83	74	26.07	195.4	1.47	0.56	1466.
100	4.10	32.83	99	26.08	195.4	1.96	1.00	1466.
125	4.10	32.87	124	26.11	192.2	2.44	1.56	1466.
150	4.61	33.78	149	26.78	129.4	2.82	2.08	1470.
175	4.61	33.87	174	26.85	122.7	3.14	2.60	1471.
200	4.79	33.95	199	26.89	119.2	3.44	3.18	1472.
225	4.56	33.95	223	26.92	116.9	3.73	3.82	1471.
250	4.43	33.98	248	26.96	113.6	4.02	4.51	1471.
300	4.22	34.01	298	27.00	109.6	4.58	6.08	1471.
400	3.76	34.07	397	27.10	100.9	5.63	9.81	1471.
500	3.61	34.16	496	27.18	93.7	6.60	14.27	1472.
600	3.42	34.23	595	27.26	87.1	7.50	19.31	1473.
800	3.06	34.36	793	27.39	75.2	9.12	30.82	1475.
1000	2.78	34.43	990	27.47	68.2	10.55	43.88	1477.
1200	2.51	34.48	1188	27.54	62.2	11.85	58.44	1479.
1500	2.25	34.54	1483	27.61	56.8	13.64	82.95	1483.



PACIFIC OCEANOGRAPHIC GROUP

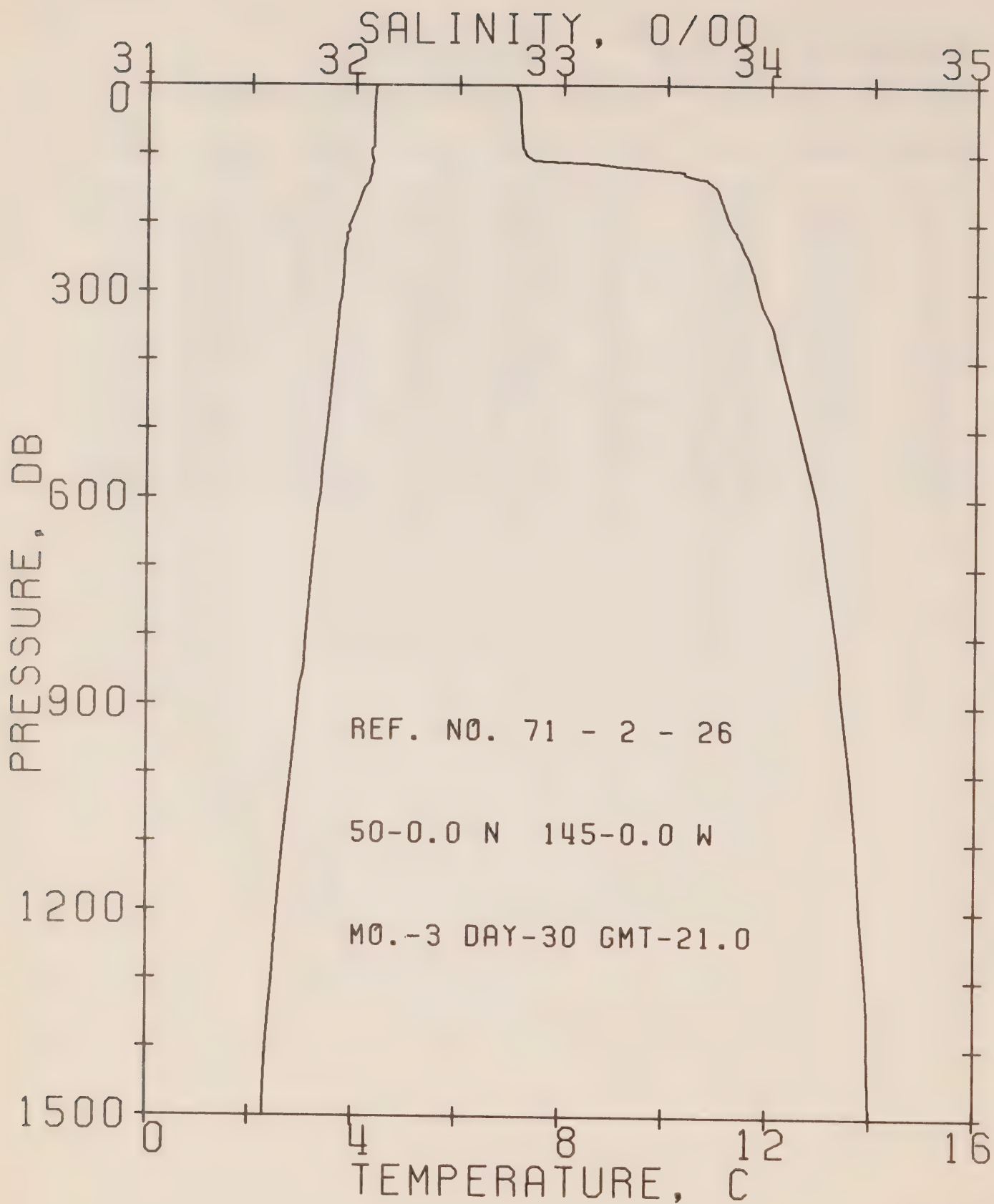
REFERENCE NO. 71- 2- 24

DATE 28/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 17.7

RESULTS OF STP CAST 22 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.50	32.81	0	26.02	199.7	0.0	0.0	1466.
10	4.50	32.81	10	26.02	200.0	0.20	0.01	1466.
20	4.50	32.81	20	26.02	200.0	0.40	0.04	1466.
30	4.50	32.81	30	26.02	200.1	0.60	0.09	1466.
50	4.49	32.81	50	26.02	200.3	1.00	0.26	1467.
75	4.49	32.81	74	26.02	200.4	1.50	0.57	1467.
100	4.22	32.81	99	26.05	197.9	2.00	1.02	1466.
125	4.31	33.67	124	26.72	134.1	2.42	1.50	1468.
150	4.12	33.75	149	26.81	126.3	2.75	1.95	1468.
175	3.96	33.80	174	26.86	121.5	3.06	2.47	1468.
200	3.86	33.84	199	26.90	117.8	3.36	3.04	1468.
225	3.80	33.88	223	26.94	114.3	3.65	3.66	1468.
250	3.78	33.92	248	26.98	110.9	3.93	4.35	1469.
300	3.75	33.98	298	27.03	106.9	4.47	5.87	1469.





PACIFIC OCEANOGRAPHIC GROUP

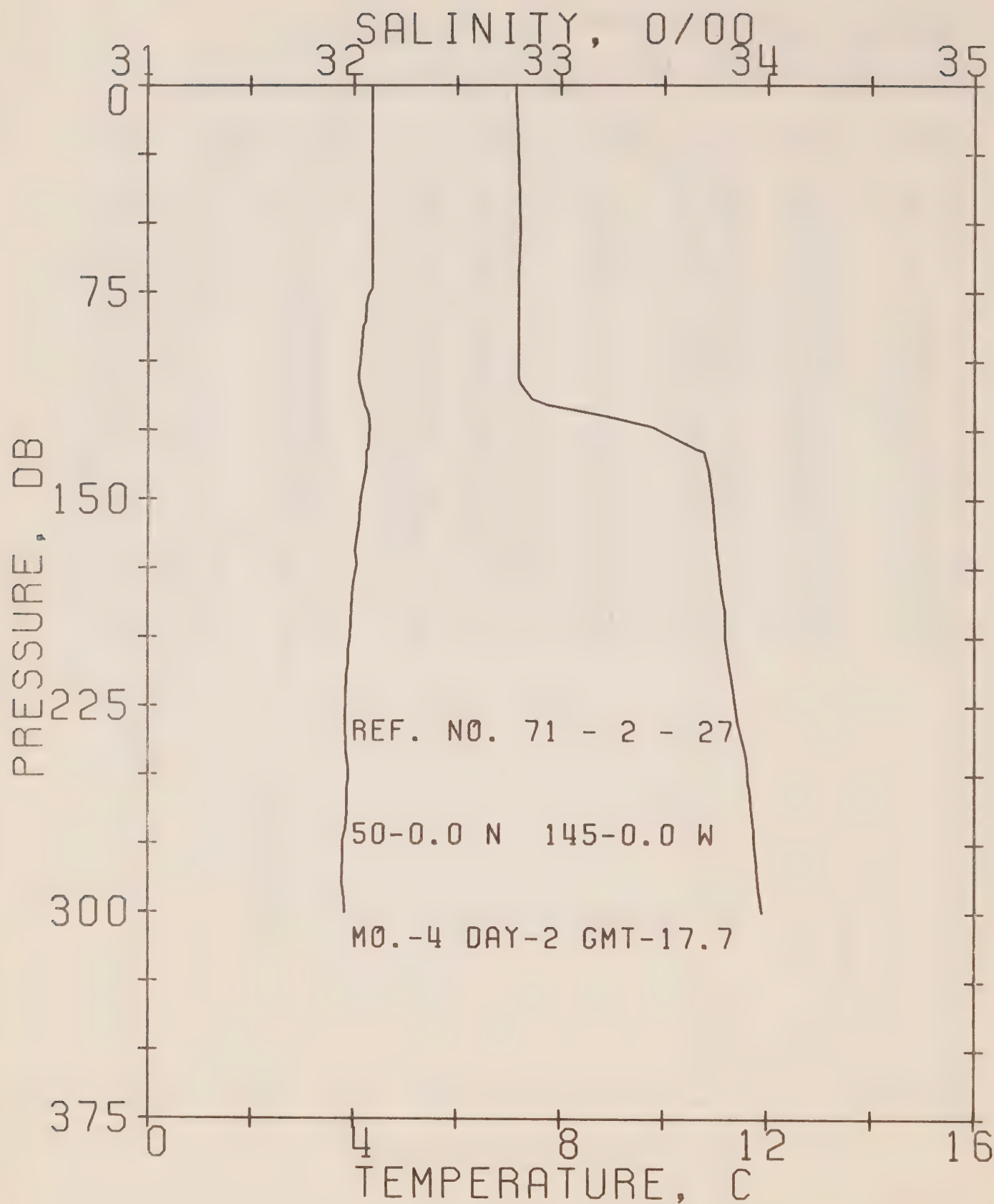
REFERENCE NO. 71- 2- 26

DATE 30/ 3/71

POSITION 50- 0.0N, 145- 0.0W GMT 21.0

RESULTS OF STP CAST 50 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.46	32.78	0	26.00	201.6	0.0	0.0	1466.
10	4.40	32.79	10	26.02	200.4	0.20	0.01	1466.
20	4.39	32.80	20	26.02	199.9	0.40	0.04	1466.
30	4.39	32.80	30	26.02	199.8	0.60	0.09	1466.
50	4.38	32.80	50	26.02	199.8	1.00	0.25	1466.
75	4.37	32.81	74	26.03	199.6	1.50	0.57	1467.
100	4.32	32.83	99	26.05	197.6	2.00	1.02	1467.
125	4.32	33.55	124	26.63	143.6	2.44	1.52	1468.
150	4.18	33.75	149	26.80	127.3	2.78	1.99	1468.
175	4.06	33.78	174	26.84	124.0	3.09	2.51	1468.
200	3.94	33.81	199	26.87	120.8	3.40	3.10	1468.
225	3.87	33.86	223	26.92	116.5	3.69	3.74	1468.
250	3.82	33.90	248	26.95	113.2	3.98	4.43	1469.
300	3.78	33.95	298	27.00	109.4	4.54	5.99	1469.
400	3.62	34.06	397	27.10	100.3	5.58	9.70	1471.
500	3.49	34.15	496	27.19	93.1	6.55	14.12	1472.
600	3.37	34.23	595	27.26	86.3	7.44	19.13	1473.
800	3.10	34.33	793	27.37	77.6	9.08	30.78	1475.
1000	2.81	34.40	990	27.45	70.6	10.57	44.37	1477.
1200	2.55	34.45	1188	27.51	65.2	11.92	59.51	1480.
1500	2.27	34.50	1483	27.57	59.9	13.78	85.01	1483.



PACIFIC OCEANOGRAPHIC GROUP

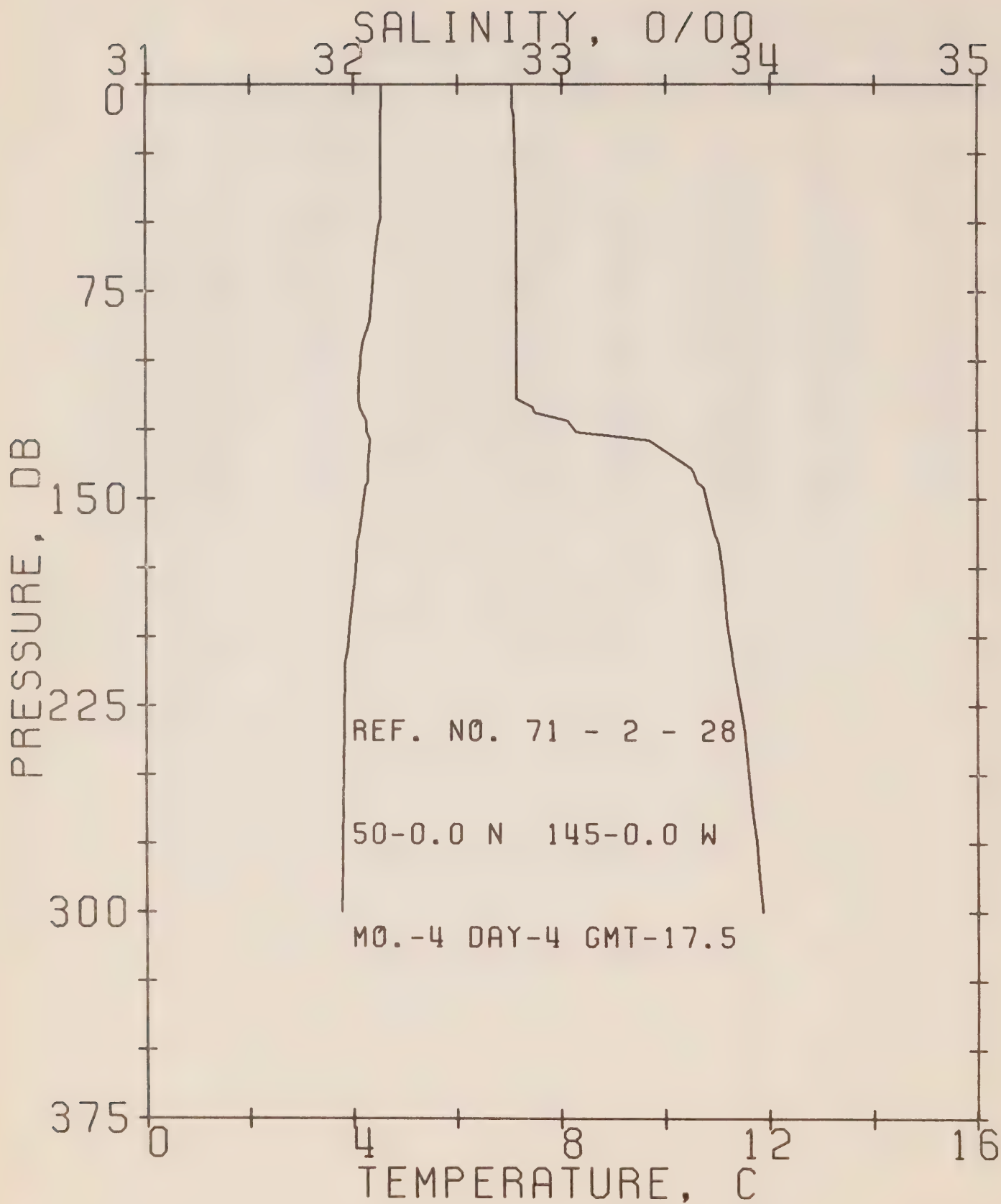
REFERENCE NO. 71- 2- 27

DATE 2/ 4/71

POSITION 50- 0.0N, 145- 0.0W GMT 17.7

RESULTS OF STP CAST 43 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.37	32.79	0	26.02	199.9	0.0	0.0	1465.
10	4.37	32.79	10	26.02	199.9	0.20	0.01	1466.
20	4.37	32.80	20	26.03	199.5	0.40	0.04	1466.
30	4.37	32.80	30	26.03	199.4	0.60	0.09	1466.
50	4.37	32.81	50	26.03	199.1	1.00	0.25	1466.
75	4.34	32.80	74	26.03	199.6	1.50	0.57	1467.
100	4.14	32.80	99	26.05	197.9	1.99	1.01	1466.
125	4.32	33.48	124	26.57	149.0	2.46	1.54	1468.
150	4.15	33.74	149	26.79	127.8	2.79	2.01	1468.
175	4.06	33.77	174	26.83	124.7	3.10	2.53	1468.
200	3.94	33.80	199	26.86	121.5	3.41	3.12	1468.
225	3.84	33.85	223	26.91	116.9	3.71	3.76	1468.
250	3.90	33.91	248	26.95	113.2	4.00	4.45	1469.
300	3.80	33.98	298	27.02	107.4	4.55	6.00	1470.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 28

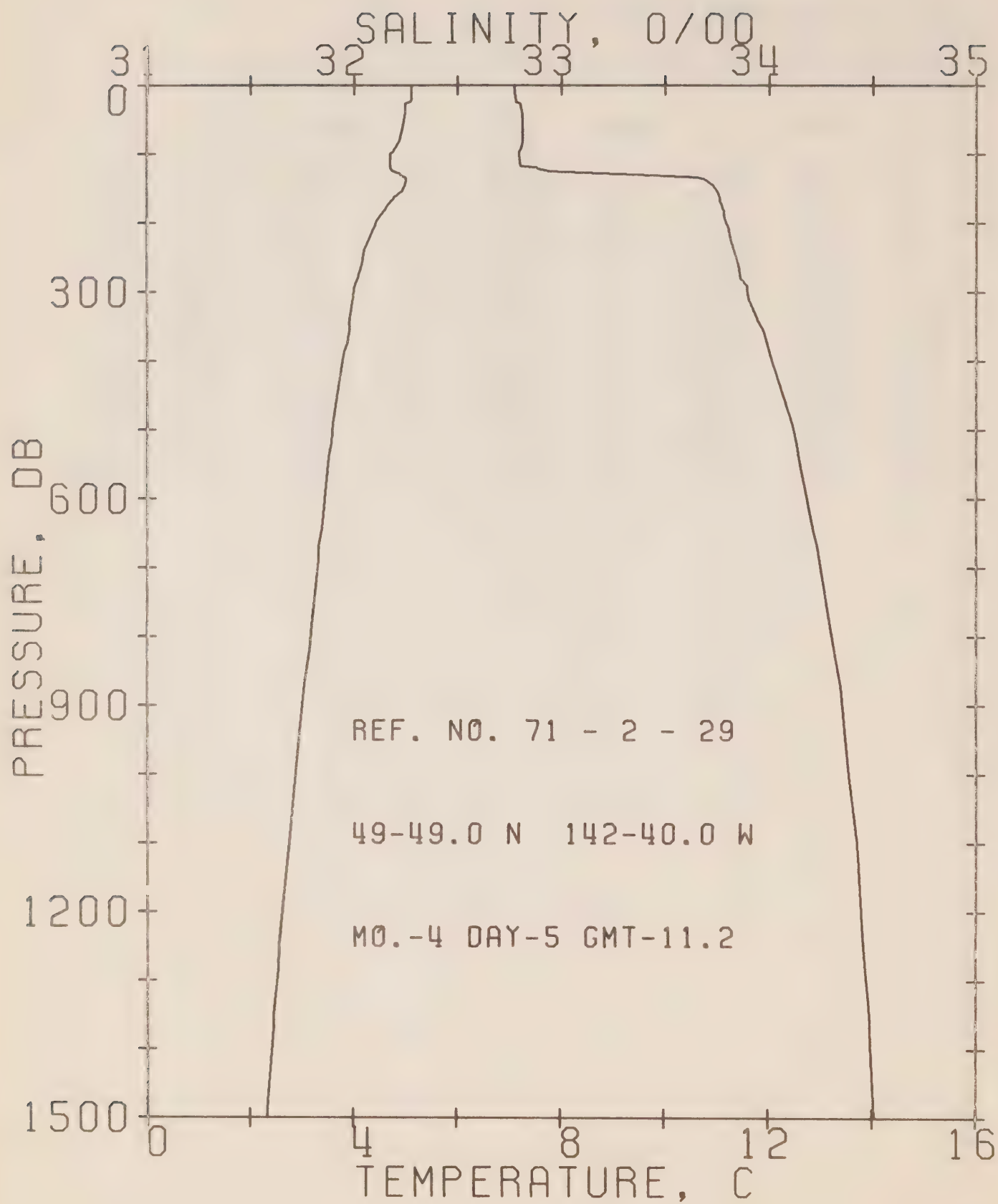
DATE 4/ 4/71

POSITION 50- 0.0N, 145- 0.0W GMT 17.5

RESULTS OF STP CAST 33 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.56	32.77	0	25.98	203.3	0.0	0.0	1466.
10	4.55	32.78	10	25.99	203.0	0.20	0.01	1466.
20	4.54	32.78	20	25.99	202.6	0.41	0.04	1466.
30	4.54	32.78	30	26.00	202.4	0.61	0.09	1467.
50	4.53	32.79	50	26.00	202.1	1.01	0.26	1467.
75	4.39	32.79	74	26.02	200.9	1.52	0.58	1467.
100	4.15	32.79	99	26.04	198.7	2.02	1.02	1466.
125	4.26	33.07	124	26.25	179.0	2.50	1.58	1467.
150	4.21	33.70	149	26.76	131.2	2.86	2.08	1468.
175	4.05	33.78	174	26.83	124.1	3.18	2.61	1468.
200	3.91	33.81	199	26.88	120.4	3.49	3.19	1468.
225	3.82	33.86	223	26.93	115.7	3.78	3.83	1468.
250	3.80	33.90	248	26.96	112.7	4.07	4.52	1469.
300	3.75	33.97	298	27.02	107.7	4.62	6.06	1469.





PACIFIC OCEANOGRAPHIC GROUP

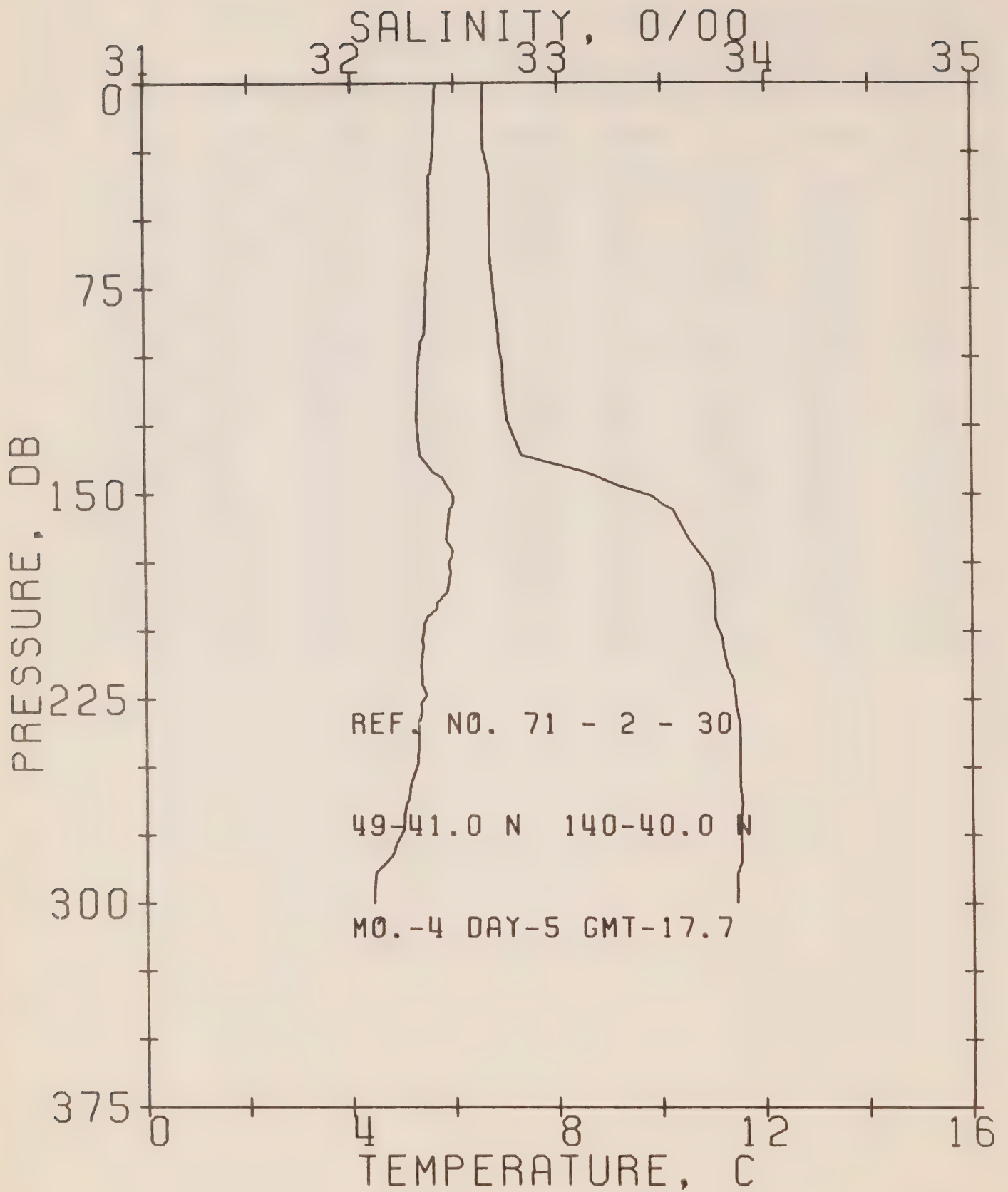
REFERENCE NO. 71- 2- 29

DATE 5/ 4/71

POSITION 49-49.0N, 142-40.0W GMT 11.2

RESULTS OF STP CAST 58 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.17	32.78	0	25.92	208.9	0.0	0.0	1469.
10	5.14	32.78	10	25.93	208.6	0.21	0.01	1469.
20	5.14	32.79	20	25.93	208.3	0.42	0.04	1469.
30	5.01	32.81	30	25.97	205.2	0.62	0.10	1469.
50	4.99	32.82	50	25.97	204.7	1.03	0.26	1469.
75	4.93	32.82	75	25.98	204.2	1.55	0.59	1469.
100	4.71	32.80	99	25.99	203.6	2.06	1.04	1469.
125	4.76	32.95	124	26.10	193.1	2.56	1.62	1469.
150	4.98	33.75	149	26.71	135.9	2.93	2.14	1472.
175	4.67	33.78	174	26.77	130.3	3.26	2.69	1471.
200	4.44	33.80	199	26.81	126.4	3.58	3.30	1470.
225	4.30	33.82	223	26.85	123.6	3.90	3.98	1470.
250	4.19	33.85	248	26.88	120.8	4.20	4.72	1470.
300	4.01	33.90	298	26.94	115.4	4.79	6.37	1470.
400	3.80	34.02	397	27.05	105.0	5.89	10.29	1471.
500	3.60	34.13	496	27.16	96.1	6.90	14.88	1472.
600	3.46	34.19	595	27.22	90.4	7.83	20.10	1473.
800	3.18	34.31	793	27.34	80.1	9.53	32.18	1476.
1000	2.88	34.39	990	27.43	72.1	11.04	46.00	1478.
1200	2.63	34.45	1188	27.50	66.1	12.42	61.39	1480.
1500	2.31	34.51	1484	27.58	59.6	14.29	87.17	1484.



PACIFIC OCEANOGRAPHIC GROUP

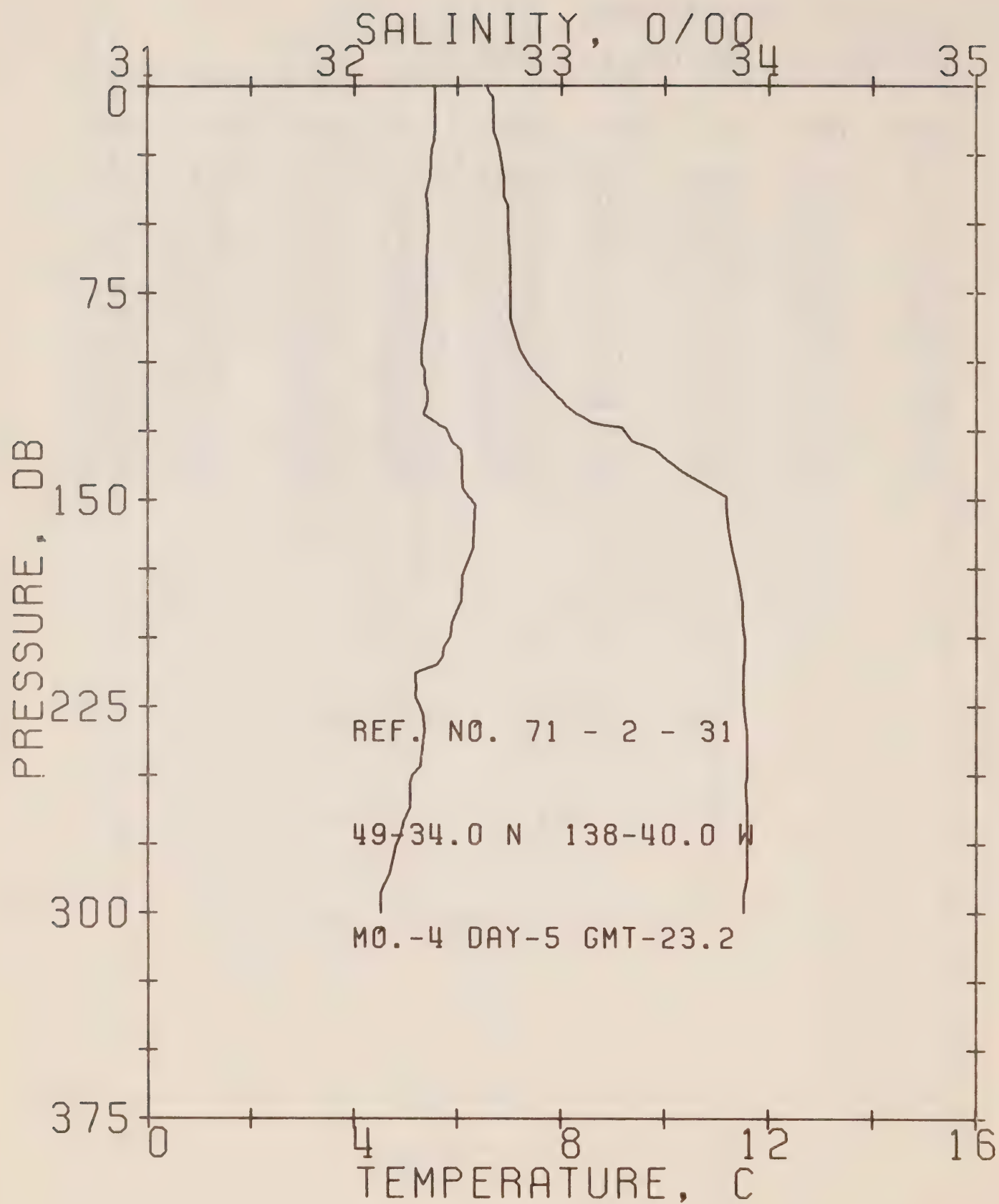
REFERENCE NO. 71- 2- 30

DATE 5/ 4/71

POSITION 49-41.0N, 140-40.0W GMT 17.7

RESULTS OF STP CAST 54 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.70	32.65	0	25.76	224.5	0.0	0.0	1471.
10	5.65	32.65	10	25.76	224.3	0.22	0.01	1471.
20	5.64	32.65	20	25.77	224.3	0.45	0.05	1471.
30	5.61	32.67	30	25.79	222.4	0.67	0.10	1471.
50	5.54	32.68	50	25.80	221.2	1.11	0.28	1471.
75	5.48	32.70	75	25.82	219.5	1.67	0.63	1471.
100	5.33	32.73	99	25.87	215.4	2.21	1.12	1471.
125	5.27	32.77	124	25.90	212.1	2.75	1.73	1471.
150	5.94	33.42	149	26.33	171.9	3.24	2.42	1475.
175	5.91	33.72	174	26.58	149.1	3.64	3.08	1476.
200	5.40	33.78	199	26.69	138.7	4.00	3.77	1474.
225	5.42	33.86	223	26.75	133.4	4.34	4.50	1475.
250	5.26	33.88	248	26.78	130.4	4.66	5.29	1475.
300	4.39	33.86	298	26.86	122.5	5.30	7.06	1472.





PACIFIC OCEANOGRAPHIC GROUP

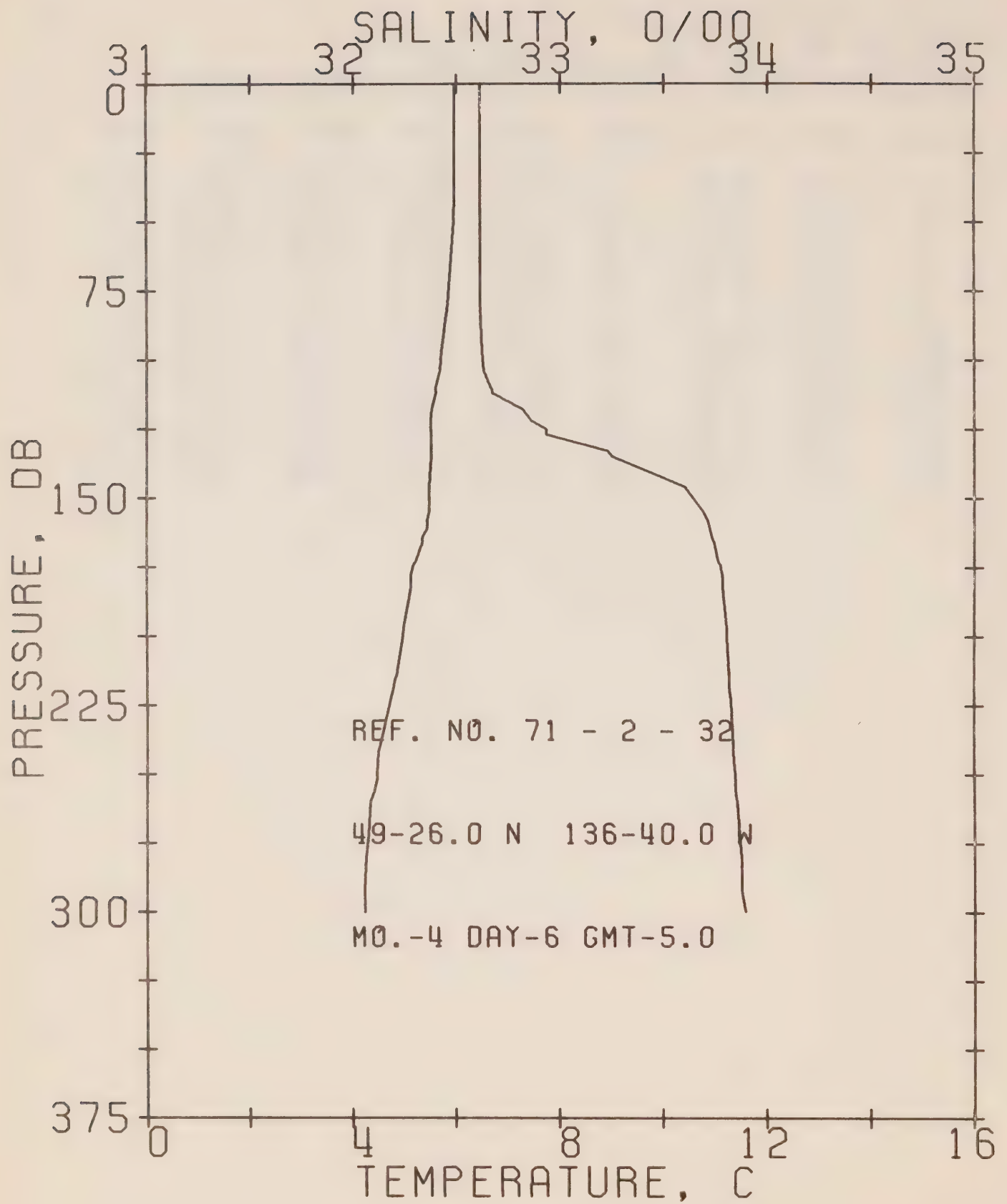
REFERENCE NO. 71- 2- 31

DATE 5/ 4/71

POSITION 49-34.0N, 138-40.0W GMT 23.2

RESULTS OF STP CAST 59 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.59	32.65	0	25.77	223.3	0.0	0.0	1470.
10	5.59	32.68	10	25.80	221.4	0.22	0.01	1471.
20	5.58	32.70	20	25.81	219.8	0.44	0.05	1471.
30	5.50	32.72	30	25.84	217.2	0.66	0.10	1471.
50	5.45	32.75	50	25.87	215.0	1.09	0.28	1471.
75	5.41	32.76	75	25.88	214.0	1.63	0.62	1471.
100	5.29	32.84	99	25.96	206.8	2.16	1.09	1471.
125	5.78	33.31	124	26.27	177.7	2.65	1.65	1474.
150	6.26	33.80	149	26.60	147.2	3.06	2.22	1477.
175	6.17	33.85	174	26.65	142.6	3.42	2.83	1477.
200	5.88	33.89	199	26.72	136.4	3.77	3.49	1476.
225	5.26	33.88	223	26.79	129.7	4.10	4.20	1474.
250	5.15	33.90	248	26.81	127.6	4.42	4.99	1474.
300	4.49	33.88	298	26.87	122.2	5.05	6.73	1472.



PACIFIC OCEANOGRAPHIC GROUP

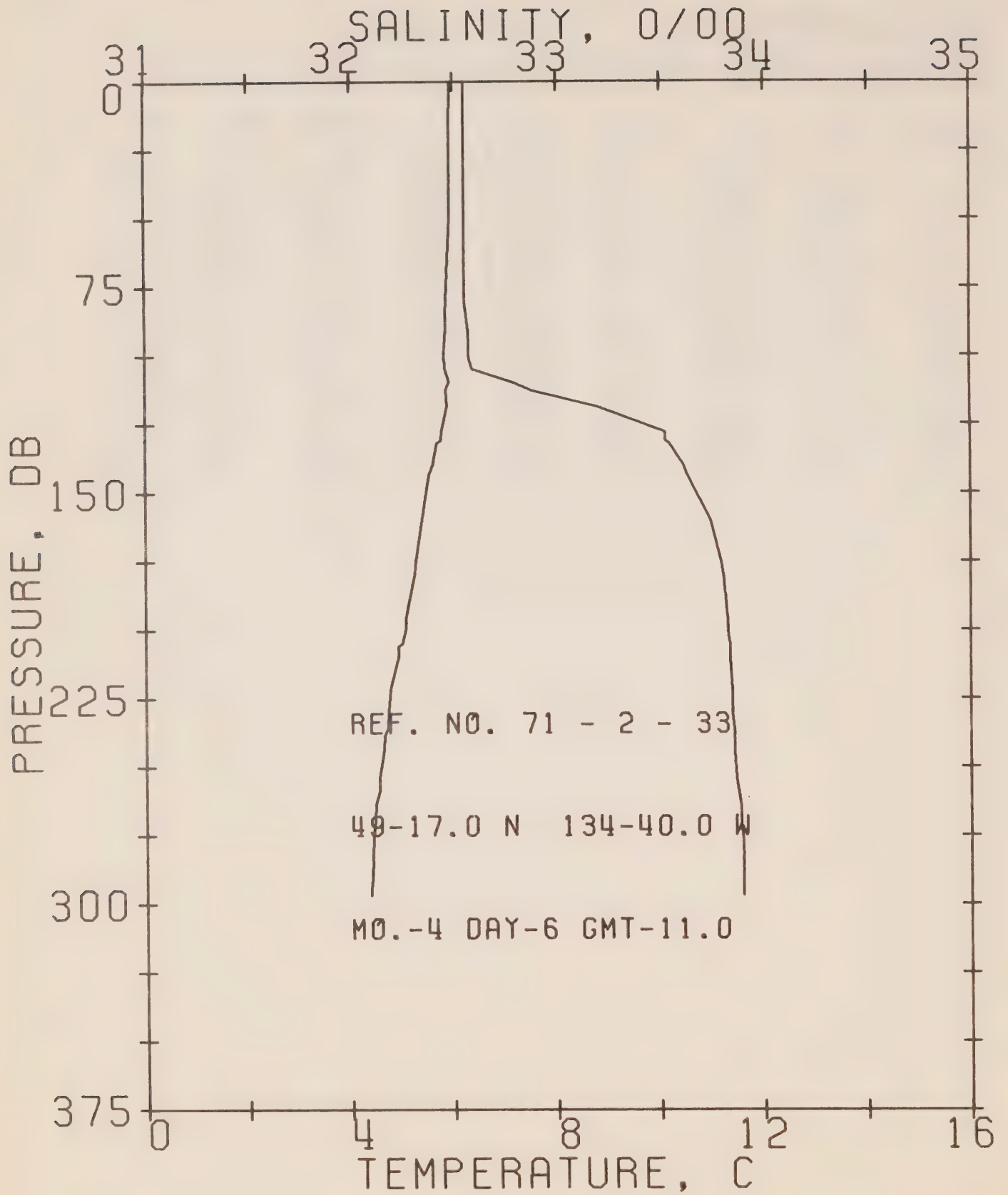
REFERENCE NO. 71- 2- 32

DATE 6/ 4/71

POSITION 49-26.0N, 136-40.0W GMT 5.0

RESULTS OF STP CAST 41 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.98	32.62	0	25.70	229.9	0.0	0.0	1472.
10	5.98	32.62	10	25.70	230.3	0.23	0.01	1472.
20	5.98	32.62	20	25.70	230.4	0.46	0.05	1472.
30	5.98	32.62	30	25.70	230.5	0.69	0.11	1472.
50	5.97	32.62	50	25.70	230.6	1.15	0.29	1473.
75	5.87	32.62	75	25.71	229.8	1.73	0.66	1473.
100	5.72	32.63	99	25.74	227.2	2.30	1.17	1472.
125	5.52	32.94	124	26.01	202.3	2.84	1.79	1472.
150	5.49	33.65	149	26.57	149.1	3.28	2.40	1474.
175	5.17	33.78	174	26.72	135.8	3.63	2.98	1473.
200	4.98	33.81	199	26.76	131.8	3.97	3.62	1473.
225	4.71	33.83	223	26.81	127.4	4.29	4.33	1472.
250	4.47	33.85	248	26.85	123.8	4.61	5.09	1471.
300	4.20	33.90	298	26.92	117.5	5.21	6.77	1471.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 33

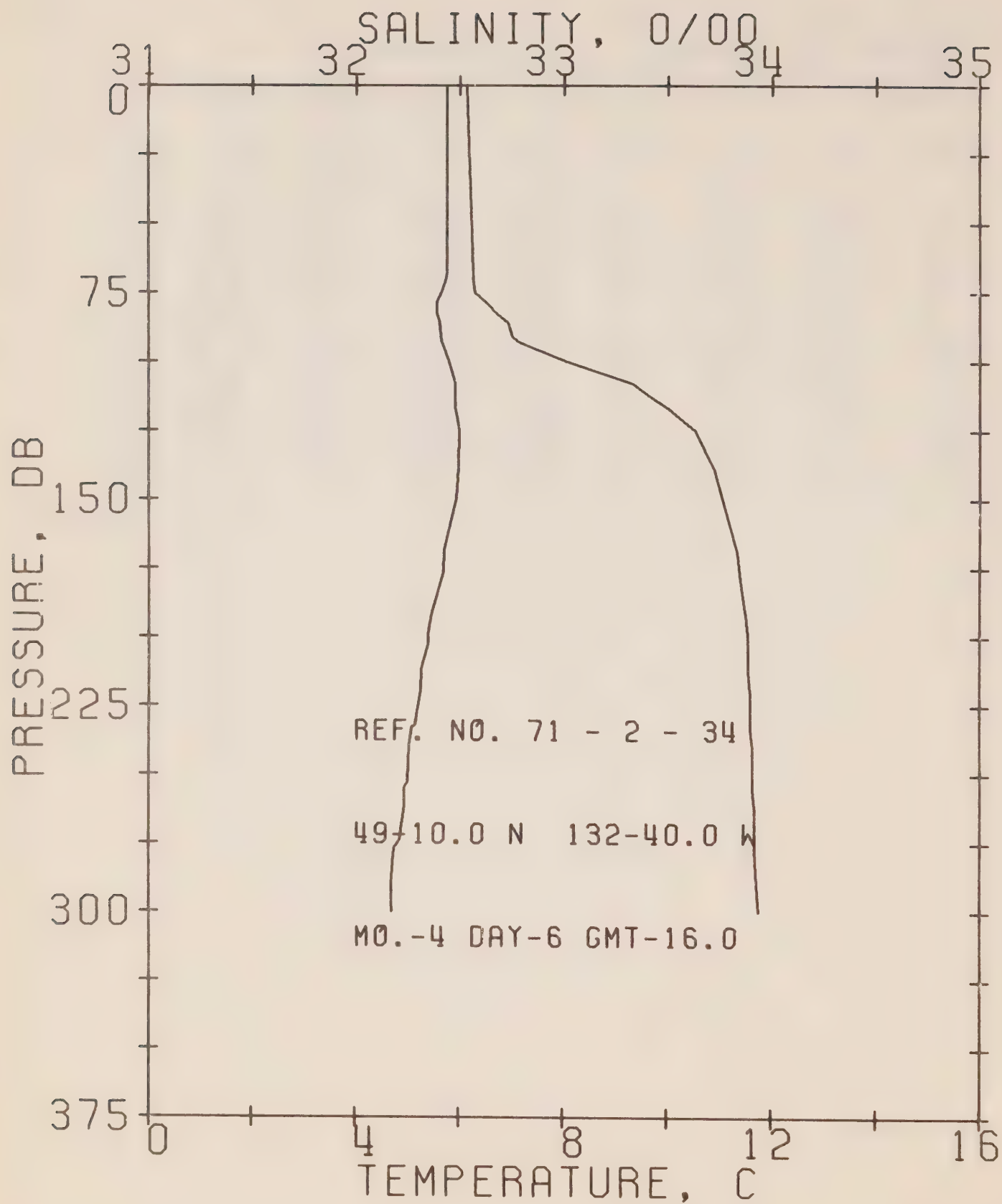
DATE 6/ 4/71

POSITION 49-17.0N, 134-40.0W GMT 11.0

RESULTS OF STP CAST 36 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.97	32.56	0	25.66	234.4	0.0	0.0	1472.
10	5.96	32.56	10	25.66	234.6	0.23	0.01	1472.
20	5.96	32.56	20	25.66	234.6	0.47	0.05	1472.
30	5.96	32.56	30	25.66	234.7	0.70	0.11	1472.
50	5.96	32.56	50	25.66	235.0	1.17	0.30	1473.
75	5.89	32.56	75	25.66	234.5	1.76	0.67	1473.
100	5.83	32.58	99	25.69	232.5	2.34	1.19	1473.
125	5.82	33.42	124	26.35	169.7	2.86	1.78	1474.
150	5.48	33.68	149	26.60	146.6	3.25	2.33	1474.
175	5.28	33.80	174	26.72	135.7	3.60	2.91	1473.
200	5.08	33.83	199	26.76	131.5	3.93	3.54	1473.
225	4.76	33.85	223	26.82	126.7	4.26	4.24	1472.
250	4.59	33.87	248	26.85	123.8	4.57	5.00	1472.





PACIFIC OCEANOGRAPHIC GROUP

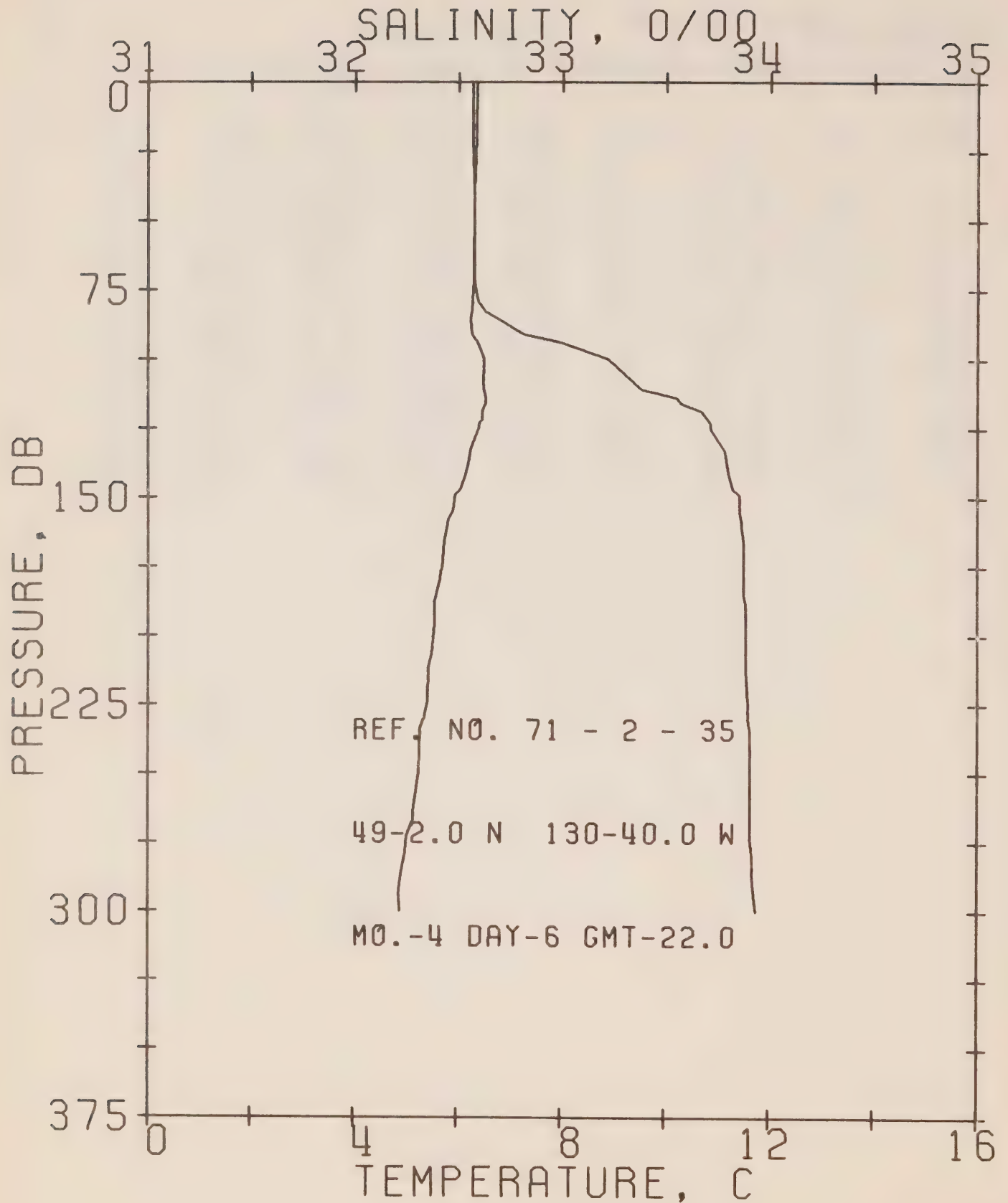
REFERENCE NO. 71- 2- 34

DATE 6/ 4/71

POSITION 49-10.0N, 132-40.0W GMT 16.0

RESULTS OF STP CAST 35 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.77	32.54	0	25.66	233.6	0.0	0.0	1471.
10	5.77	32.54	10	25.67	233.5	0.23	0.01	1471.
20	5.77	32.55	20	25.67	233.3	0.47	0.05	1471.
30	5.77	32.55	30	25.67	233.1	0.70	0.11	1471.
50	5.77	32.56	50	25.68	232.7	1.17	0.30	1472.
75	5.67	32.58	75	25.71	230.4	1.75	0.67	1472.
100	5.79	33.02	99	26.04	199.1	2.29	1.15	1473.
125	6.01	33.64	124	26.50	155.7	2.72	1.64	1475.
150	5.96	33.77	149	26.61	145.7	3.10	2.17	1476.
175	5.71	33.85	174	26.70	137.3	3.45	2.75	1475.
200	5.41	33.89	199	26.77	130.8	3.78	3.39	1474.
225	5.22	33.90	223	26.80	128.2	4.11	4.09	1474.
250	5.02	33.91	248	26.83	125.4	4.42	4.85	1474.
300	4.67	33.94	298	26.90	119.7	5.03	6.57	1473.



PACIFIC OCEANOGRAPHIC GROUP

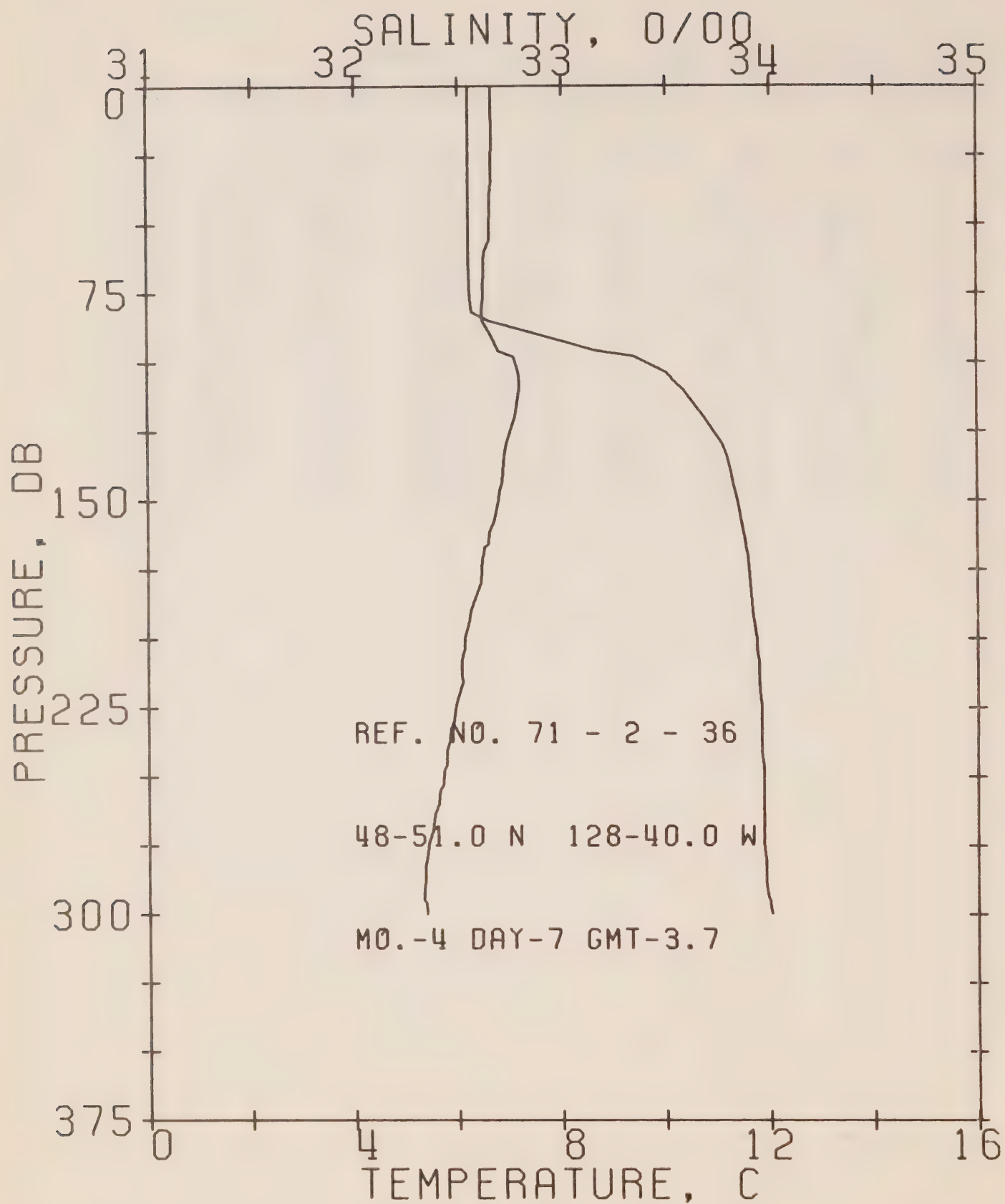
REFERENCE NO. 71- 2- 35

DATE 6/ 4/71

POSITION 49- 2.0N, 130-40.0W GMT 22.0

RESULTS OF STP CAST 45 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.37	32.57	0	25.61	238.4	0.0	0.0	1473.
10	6.36	32.57	10	25.61	238.6	0.24	0.01	1473.
20	6.36	32.57	20	25.61	238.6	0.48	0.05	1474.
30	6.34	32.57	30	25.62	238.2	0.72	0.11	1474.
50	6.32	32.58	50	25.63	237.7	1.19	0.30	1474.
75	6.30	32.59	75	25.64	237.2	1.79	0.68	1474.
100	6.50	33.23	99	26.12	192.0	2.34	1.17	1476.
125	6.42	33.72	124	26.51	154.9	2.77	1.67	1477.
150	5.95	33.86	149	26.68	139.0	3.14	2.18	1476.
175	5.71	33.88	174	26.73	134.8	3.48	2.74	1475.
200	5.54	33.89	199	26.76	132.4	3.81	3.38	1475.
225	5.42	33.90	223	26.78	130.4	4.14	4.09	1475.
250	5.26	33.91	248	26.81	128.1	4.46	4.87	1475.
300	4.85	33.94	298	26.88	121.7	5.09	6.62	1474.





PACIFIC OCEANOGRAPHIC GROUP

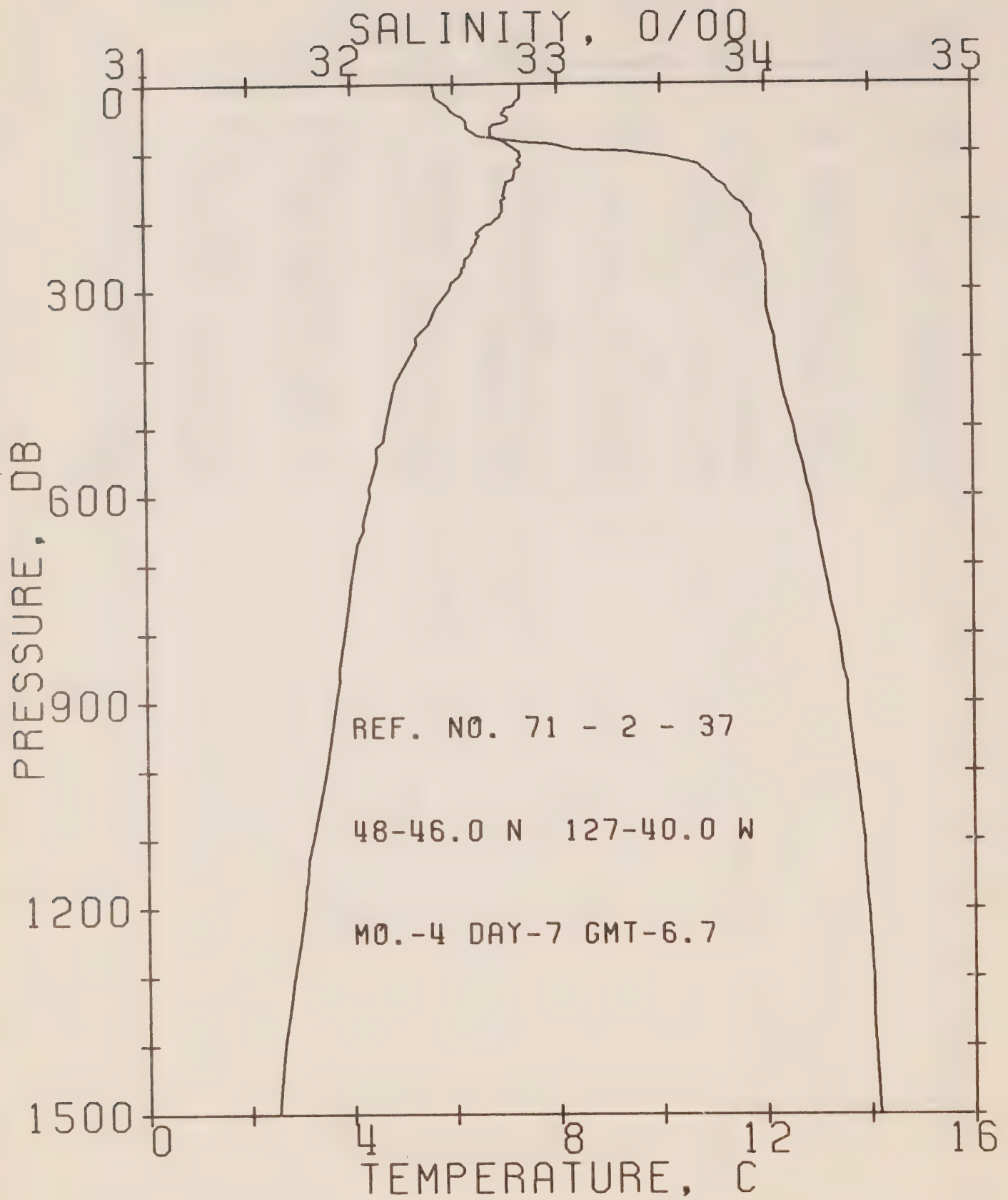
REFERENCE NO. 71- 2- 36

DATE 7/ 4/71

POSITION 48-51.0N, 128-40.0W GMT 3.7

RESULTS OF STP CAST 58 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.67	32.55	0	25.56	243.5	0.0	0.0	1475.
10	6.67	32.55	10	25.56	243.9	0.24	0.01	1475.
20	6.68	32.55	20	25.56	244.1	0.49	0.05	1475.
30	6.67	32.55	30	25.56	244.1	0.73	0.11	1475.
50	6.63	32.55	50	25.56	243.8	1.22	0.31	1475.
75	6.49	32.56	75	25.59	241.8	1.83	0.70	1475.
100	7.10	33.40	99	26.17	186.8	2.38	1.19	1479.
125	7.03	33.73	124	26.44	161.7	2.81	1.68	1480.
150	6.80	33.85	149	26.56	150.4	3.20	2.23	1479.
175	6.47	33.90	174	26.65	142.5	3.57	2.83	1478.
200	6.14	33.94	199	26.72	135.9	3.92	3.50	1477.
225	5.95	33.96	223	26.76	132.4	4.25	4.22	1477.
250	5.72	33.97	248	26.80	129.1	4.58	5.02	1477.
300	5.35	34.01	298	26.87	122.2	5.21	6.78	1476.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 37

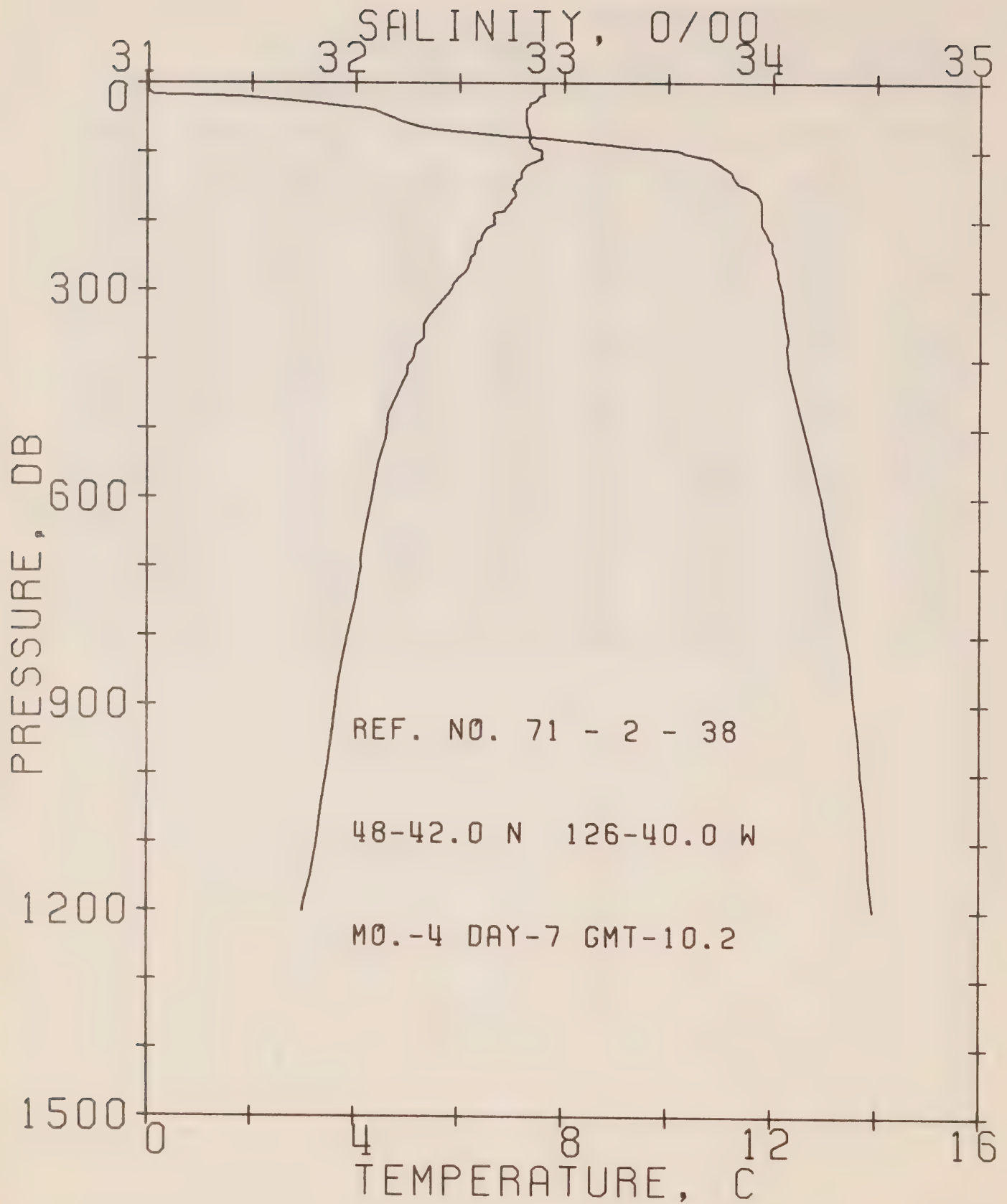
DATE 7/ 4/71

POSITION 48-46.0N, 127-40.0W

GMT 6.7

RESULTS OF STP CAST 102 POINTS TAKEN FROM ANALOG TRACE

FPRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.32	32.40	0	25.35	262.9	0.0	0.0	1477.
10	7.32	32.41	10	25.36	262.6	0.26	0.01	1477.
20	7.32	32.42	20	25.37	262.0	0.53	0.05	1477.
30	7.22	32.47	30	25.42	257.0	0.78	0.12	1477.
50	7.08	32.56	50	25.51	249.0	1.29	0.32	1477.
75	6.72	32.62	75	25.61	239.7	1.90	0.71	1476.
100	7.30	33.37	99	26.12	192.1	2.45	1.20	1480.
125	7.23	33.71	124	26.40	165.7	2.89	1.70	1480.
150	7.03	33.82	149	26.51	155.7	3.29	2.27	1480.
175	6.96	33.90	174	26.58	149.1	3.68	2.90	1480.
200	6.82	33.94	199	26.63	144.7	4.04	3.60	1480.
225	6.49	33.98	223	26.70	138.0	4.40	4.37	1479.
250	6.33	34.00	248	26.75	134.5	4.74	5.19	1479.
300	5.93	34.01	298	26.80	129.4	5.39	7.04	1478.
400	5.13	34.06	397	26.94	117.0	6.62	11.41	1477.
500	4.67	34.14	496	27.06	106.8	7.74	16.53	1477.
600	4.36	34.22	595	27.15	98.2	8.76	22.25	1477.
800	3.85	34.35	793	27.31	84.5	10.59	35.22	1478.
1000	3.48	34.43	990	27.41	75.8	12.19	49.88	1480.
1200	3.04	34.49	1188	27.50	67.8	13.61	65.81	1482.
1500	2.49	34.54	1484	27.59	59.5	15.52	91.95	1484.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 38

DATE 7/ 4/71

POSITION 48-42.0N, 126-40.0W GMT 10.2

RESULTS OF STP CAST 80 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.61	30.99	0	24.21	372.0	0.0	0.0	1476.
10	7.63	31.00	10	24.21	371.9	0.37	0.02	1476.
20	7.56	31.45	20	24.58	337.5	0.74	0.07	1477.
30	7.36	31.83	30	24.90	306.6	1.06	0.16	1477.
50	7.28	32.18	50	25.19	279.6	1.64	0.39	1477.
75	7.35	32.65	75	25.54	246.2	2.31	0.82	1479.
100	7.59	33.57	99	26.23	181.4	2.83	1.28	1481.
125	7.26	33.78	124	26.45	161.0	3.26	1.77	1481.
150	7.06	33.87	149	26.54	152.3	3.65	2.32	1480.
175	7.00	33.95	174	26.62	146.0	4.02	2.93	1481.
200	6.68	33.95	199	26.66	142.1	4.38	3.62	1480.
225	6.45	33.99	223	26.72	136.7	4.73	4.37	1479.
250	6.28	34.01	248	26.76	132.8	5.07	5.19	1479.
300	5.87	34.05	298	26.84	125.7	5.71	7.00	1478.
400	5.13	34.08	397	26.96	115.5	6.91	11.25	1477.
500	4.63	34.16	496	27.07	105.0	8.01	16.29	1477.
600	4.35	34.24	595	27.17	96.6	9.02	21.93	1477.
800	3.87	34.36	793	27.32	83.8	10.82	34.75	1479.
1000	3.47	34.43	991	27.41	75.7	12.41	49.26	1480.
1200	2.98	34.49	1188	27.50	67.1	13.84	65.32	1482.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 39

DATE 7/ 4/71

POSITION 48-38.0N, 126- 0.0W GMT 13.5

RESULTS OF STP CAST 26 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.85	30.59	0	23.86	405.0	0.0	0.0	1477.
10	8.00	31.33	10	24.42	352.2	0.39	0.02	1478.
20	7.52	31.77	20	24.83	313.1	0.72	0.07	1477.
30	7.44	31.88	30	24.93	303.9	1.03	0.15	1477.
50	7.41	32.11	50	25.11	286.7	1.62	0.39	1478.
75	7.29	32.70	75	25.59	241.5	2.30	0.82	1478.
100	6.94	33.80	99	26.51	155.3	2.76	1.23	1479.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	7.85	30.59	40.	7.41	32.00
4.	7.85	30.59	50.	7.41	32.11
10.	8.00	31.33	54.	7.36	32.15
12.	7.87	31.47	60.	7.36	32.22
14.	7.84	31.55	70.	7.30	32.35
15.	7.76	31.65	80.	7.29	33.05
18.	7.71	31.75	84.	7.24	33.37
20.	7.52	31.77	85.	7.26	33.45
22.	7.48	31.79	88.	7.26	33.55
28.	7.47	31.85	90.	7.21	33.61
30.	7.44	31.88	91.	7.03	33.65
33.	7.45	31.93	96.	6.96	33.75
39.	7.45	31.99	100.	6.94	33.80

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 2- 40

DATE 7/ 4/71

POSITION 48-33.0N, 125-33.0W GMT 15.2

RESULTS OF STP CAST 24 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.89	31.14	0	24.29	364.6	0.0	0.0	1477.
10	7.90	31.15	10	24.29	364.3	0.36	0.02	1478.
20	7.38	31.69	20	24.79	317.0	0.71	0.07	1477.
30	7.38	31.91	30	24.96	300.9	1.01	0.15	1477.
50	7.52	32.42	50	25.34	265.0	1.58	0.38	1479.
75	7.43	33.03	75	25.84	218.4	2.18	0.75	1479.
100	7.19	33.24	99	26.03	200.2	2.70	1.22	1479.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	7.89	31.14	56.	7.54	32.55
10.	7.90	31.15	58.	7.57	32.67
15.	7.76	31.33	64.	7.48	32.89
16.	7.51	31.51	70.	7.47	32.95
19.	7.38	31.67	72.	7.43	33.02
26.	7.38	31.83	76.	7.43	33.04
33.	7.38	31.97	79.	7.40	33.07
39.	7.39	32.15	85.	7.38	33.10
43.	7.46	32.27	87.	7.29	33.15
47.	7.46	32.30	92.	7.29	33.16
50.	7.52	32.42	98.	7.19	33.23
53.	7.54	32.51	100.	7.19	33.24



SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-71-2)

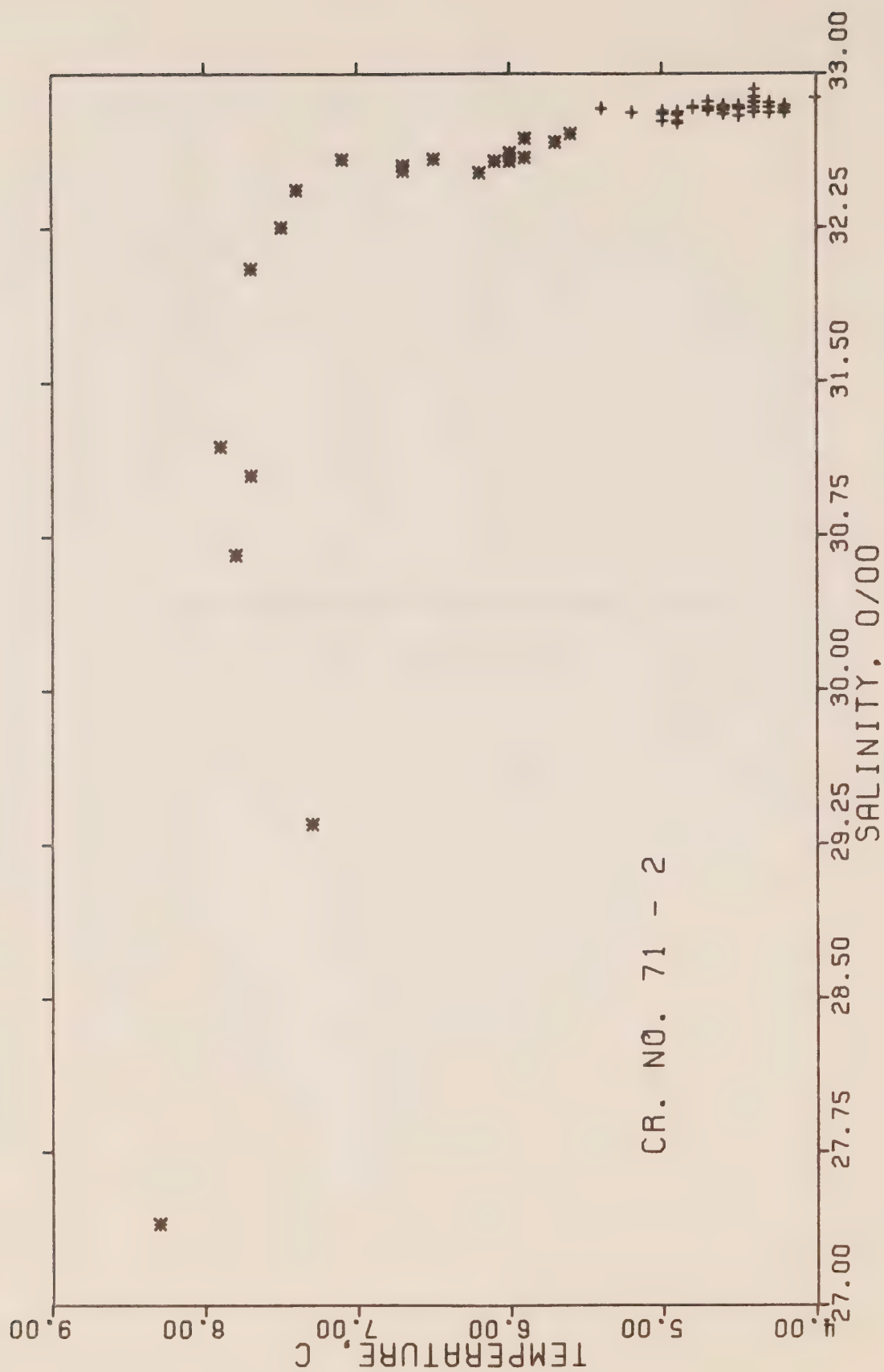


Fig. 16 T-S plot of surface temperature and salinity observations on Line P (asterisks) and at Station P (pluses) during Cruise P-71-2.



SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 2

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DAY	GMT	0/00	C	WEST
71	2	20	100	27.397	8.3	125-33
71	2	20	300	29.349	7.3	126- 0
71	2	20	525	32.048	7.7	126-40
71	2	20	945	32.250	7.5	127-40
71	2	20	1345	32.579	7.1	128-40
71	2	23	0	32.810	5.2	145- 0
71	2	24	0	32.767	5.0	ON STATION
71	2	25	0	32.815	5.0	ON STATION
71	2	26	0	32.769	4.9	ON STATION
71	2	27	0	32.796	4.9	ON STATION
71	2	28	0	32.803	5.0	ON STATION
71	3	1	0	32.757	4.9	ON STATION
71	3	2	0	32.813	4.9	ON STATION
71	3	4	0	32.861	4.7	ON STATION
71	3	5	0	32.835	4.7	ON STATION
71	3	6	0	32.807	4.4	ON STATION
71	3	7	0	32.829	4.6	ON STATION
71	3	8	0	32.843	4.5	ON STATION
71	3	9	0	32.843	4.6	ON STATION
71	3	10	0	32.810	4.4	ON STATION
71	3	11	0	32.829	4.2	ON STATION
71	3	12	0	32.810	4.3	ON STATION
71	3	13	0	32.858	4.4	ON STATION
71	3	14	0	32.880	4.0	ON STATION
71	3	15	0	32.883	4.4	ON STATION
71	3	16	0	32.842	4.2	ON STATION
71	3	17	0	32.809	4.2	ON STATION
71	3	18	0	32.829	4.5	ON STATION
71	3	19	0	32.835	4.4	ON STATION
71	3	20	0	32.831	4.5	ON STATION
71	3	21	0	32.861	4.4	ON STATION
71	3	22	0	32.922	4.4	ON STATION
71	3	23	0	32.834	4.3	ON STATION
71	3	24	0	32.836	4.6	ON STATION
71	3	25	0	32.859	4.3	ON STATION
71	3	26	0	32.832	4.8	ON STATION
71	3	27	0	32.835	4.4	ON STATION
71	3	28	0	32.792	4.5	ON STATION
71	3	29	0	32.814	4.4	ON STATION
71	3	30	0	32.839	4.8	ON STATION
71	3	31	0	32.821	4.7	ON STATION
71	4	1	0	32.830	4.6	ON STATION
71	4	2	0	32.831	4.6	ON STATION
71	4	3	0	32.800	4.6	ON STATION
71	4	4	0	32.820	4.6	ON STATION
71	4	5	0	32.840	4.6	ON STATION
71	4	5	1115	32.826	5.4	142-40
71	4	5	1745	32.681	5.9	140-40
71	4	5	2315	32.664	5.7	138-40

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 2

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
71	4	5	2315	32.664	5.7	138-40
71	4	6	200	32.705	5.6	137-40
71	4	6	500	32.610	6.0	136-40
71	4	6	805	32.587	5.9	135-40
71	4	6	1100	32.569	6.1	134-40
71	4	6	1600	32.569	6.0	132-40
71	4	6	1910	32.511	6.2	131-40
71	4	6	2200	32.579	6.5	130-40
71	4	7	45	32.523	6.7	129-40
71	4	7	345	32.549	6.7	128-40
71	4	7	645	32.429	7.4	127-40
71	4	7	1045	31.043	7.7	126-40
71	4	7	1330	30.657	7.8	126- 0
71	4	7	1515	31.186	7.9	125-33

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-71-3

(C.O.D.C. REFERENCE No. 02-71-003)

# SALINITY DIFFERENCE, NANSEN - S.T.D., ‰

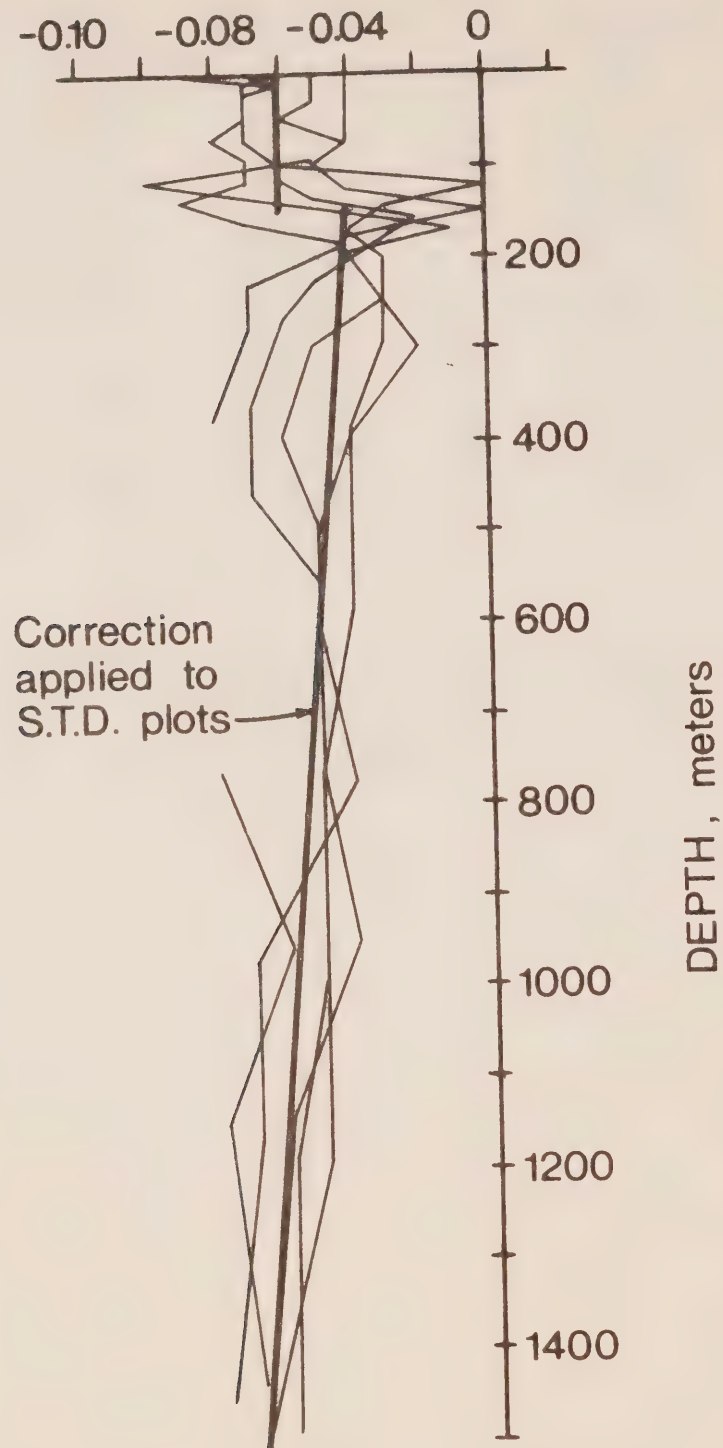


Fig. 17 Profiles of the differences in salinity values, obtained from bottles and from a Bissett-Berman Model 9040 STD P-71-3.

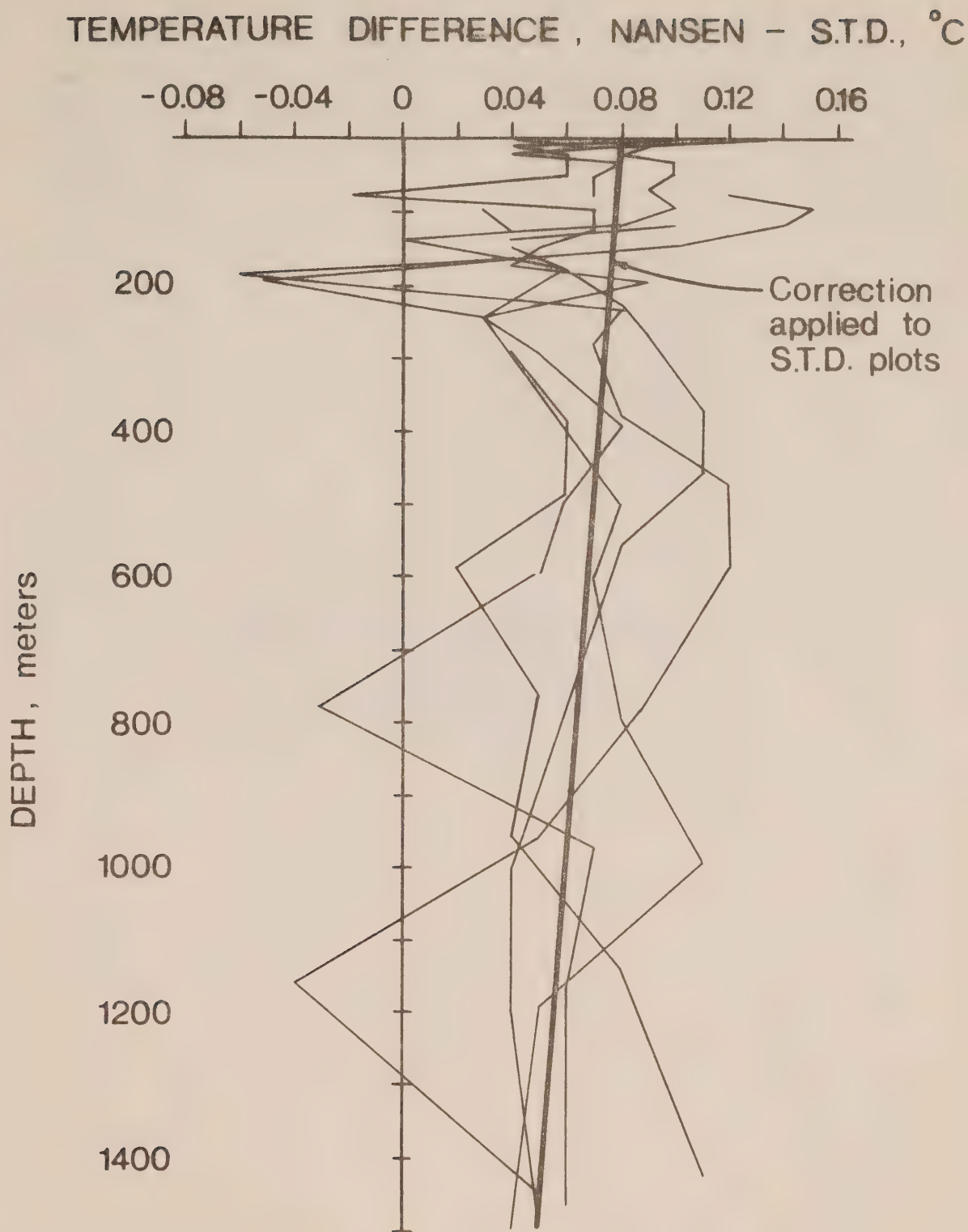


Fig. 18 Profiles of the differences in temperatures obtained from reversing thermometers and a Bissett-Berman Model 9040 STD P-71-3.





COMPOSITE PLOTS OF TEMPERATURE, SALINITY  
AND DISSOLVED OXYGEN VS. DEPTH  
(P-71-3)

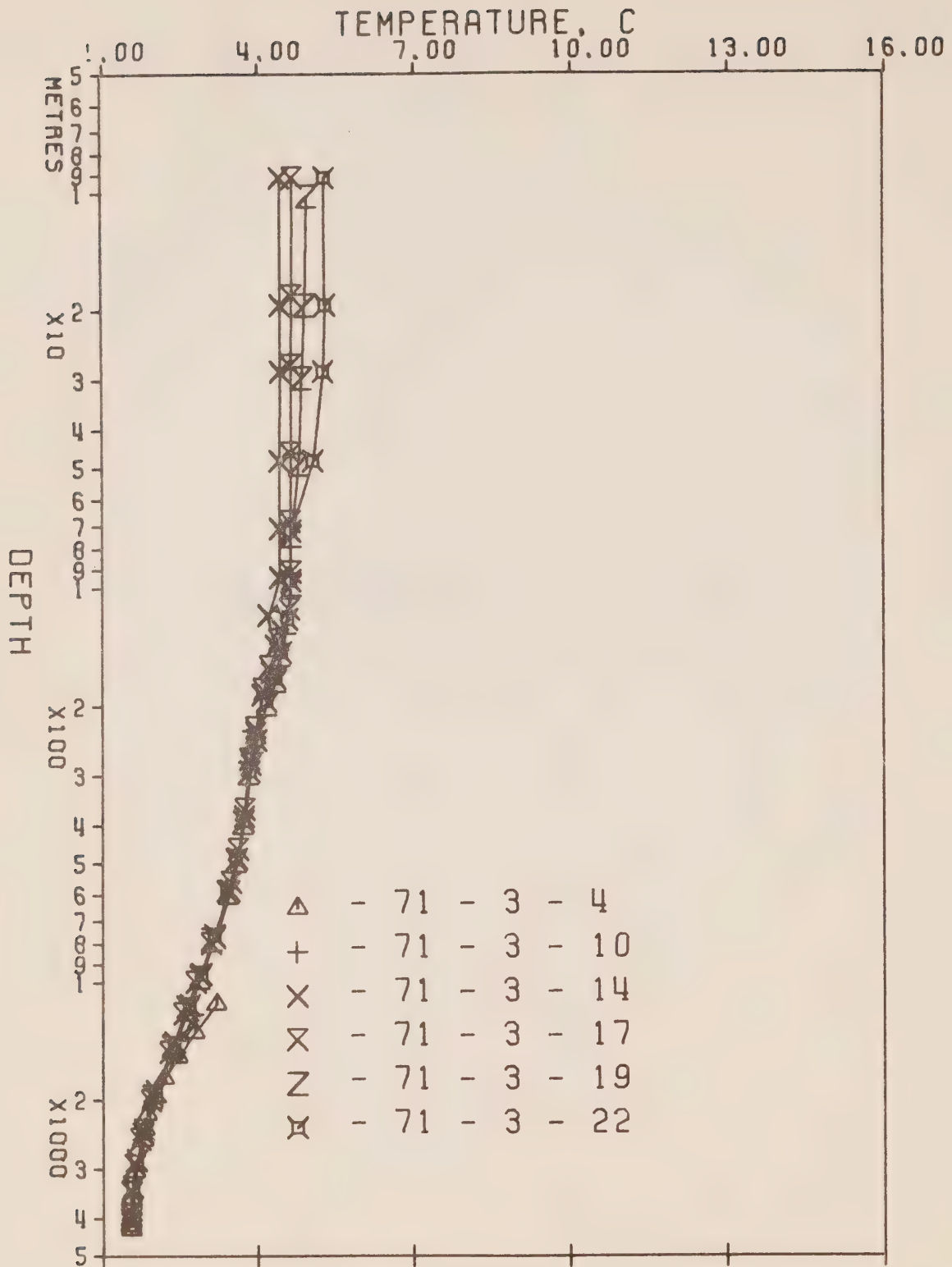


Fig. 19 Composite Plot of temperature vs. Log Depth P-71-3.

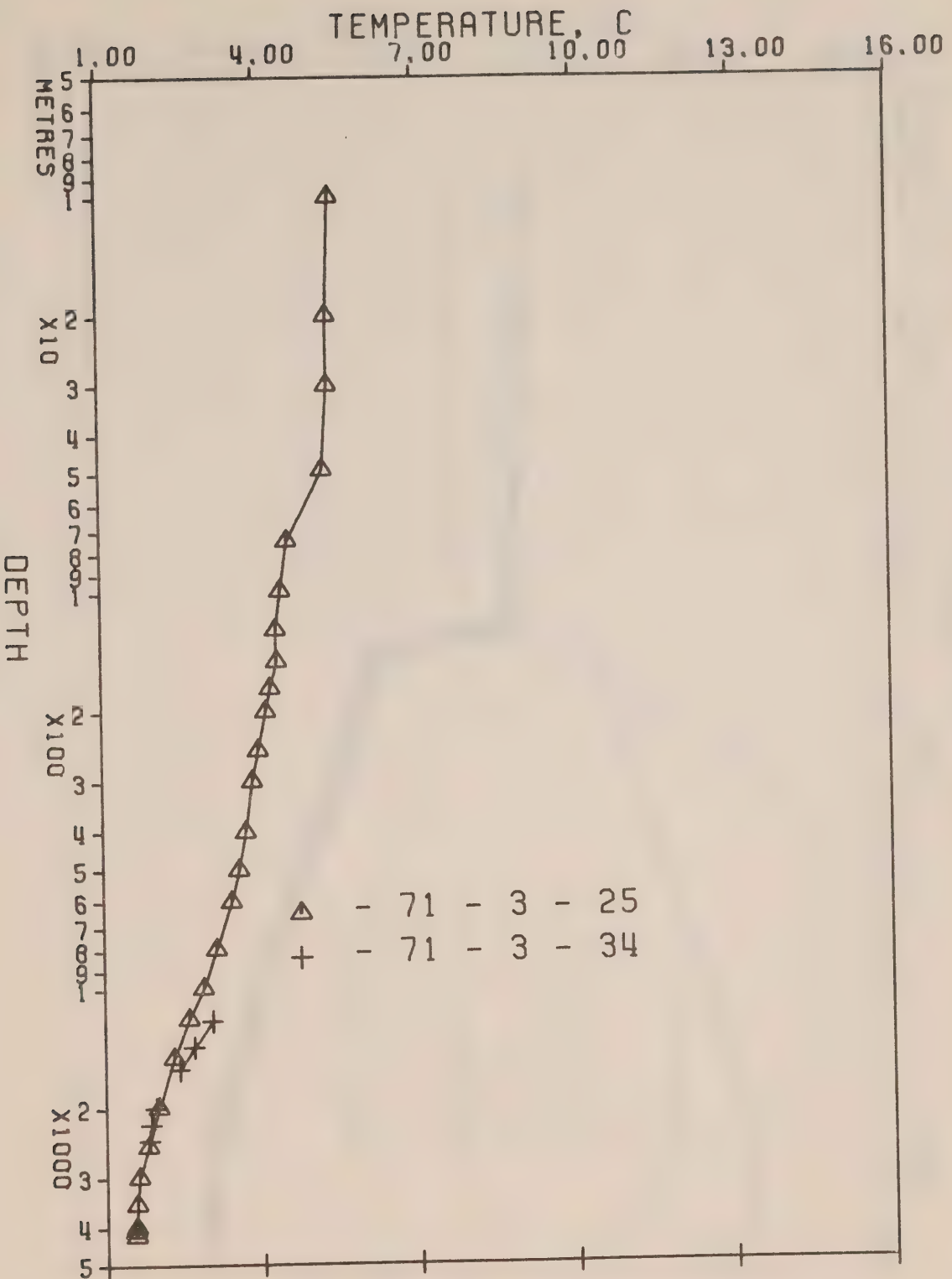


Fig. 20 Composite Plot of temperature vs.  $\log_{10}$  Depth P-71-3.

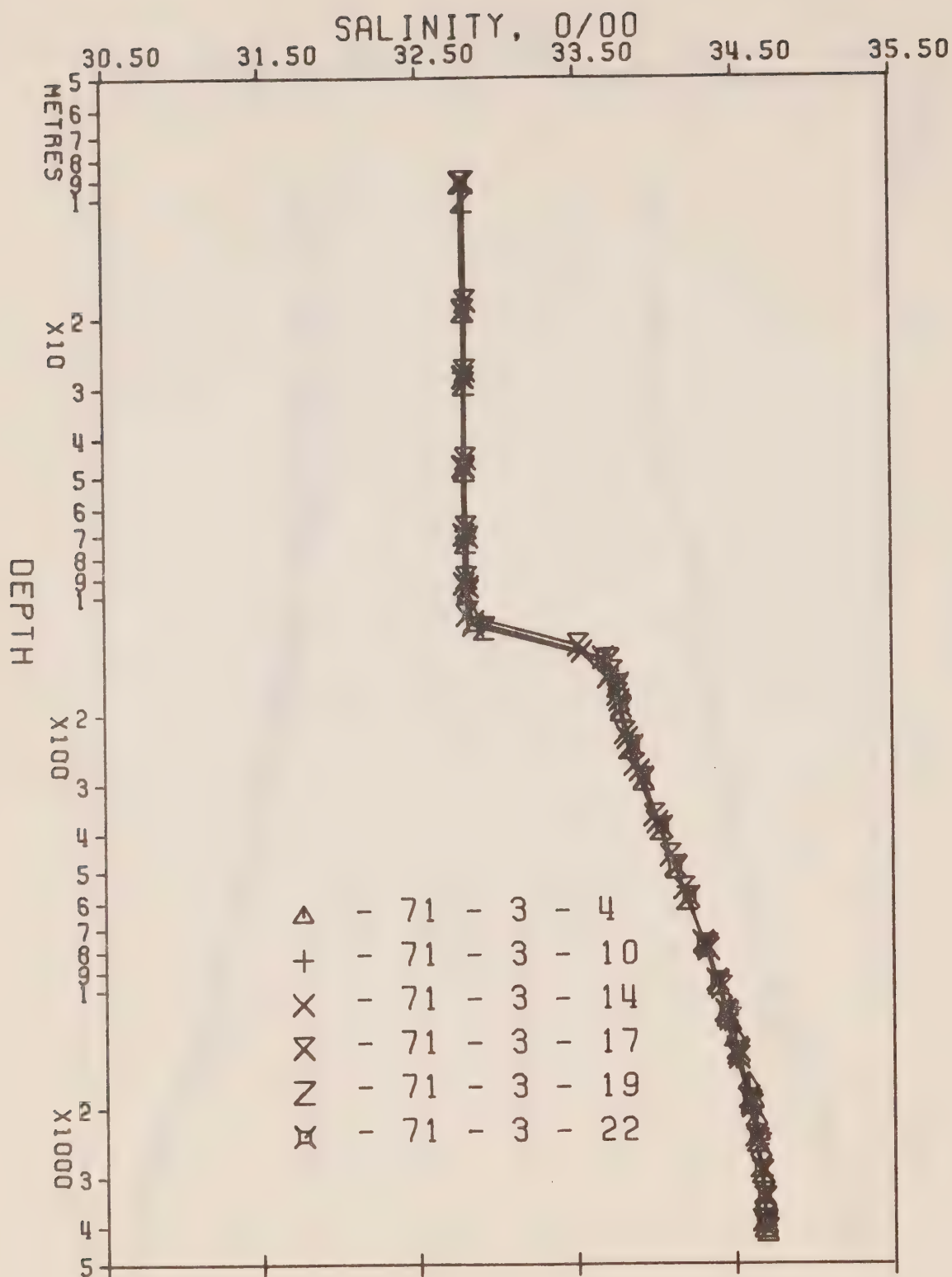


Fig. 21 Composite Plot of salinity vs.  $\log_{10}$  Depth P-71-3.

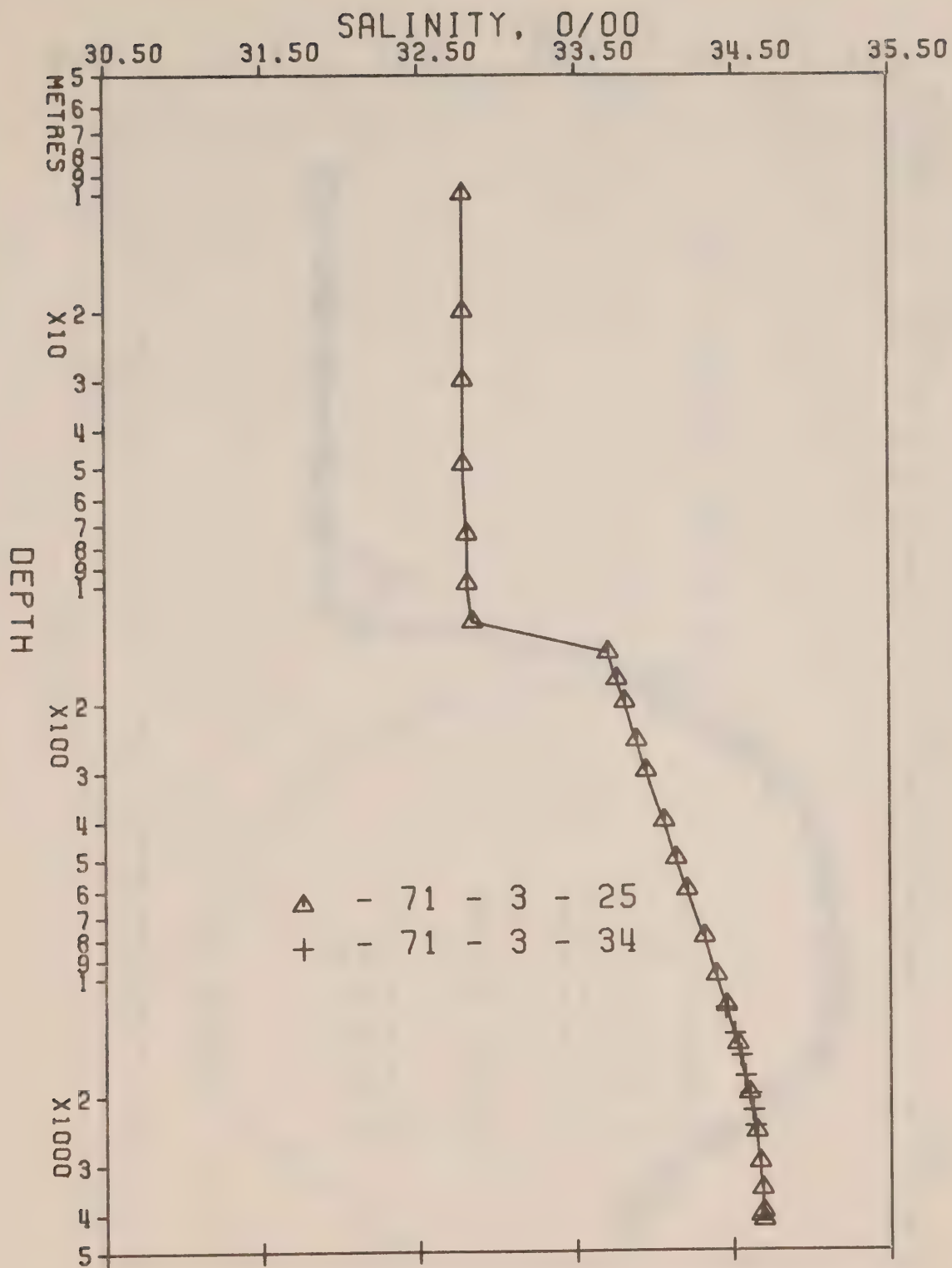


Fig. 22 Composite Plot of salinity vs.  $\text{Log}_{10}$  Depth P-71-3.



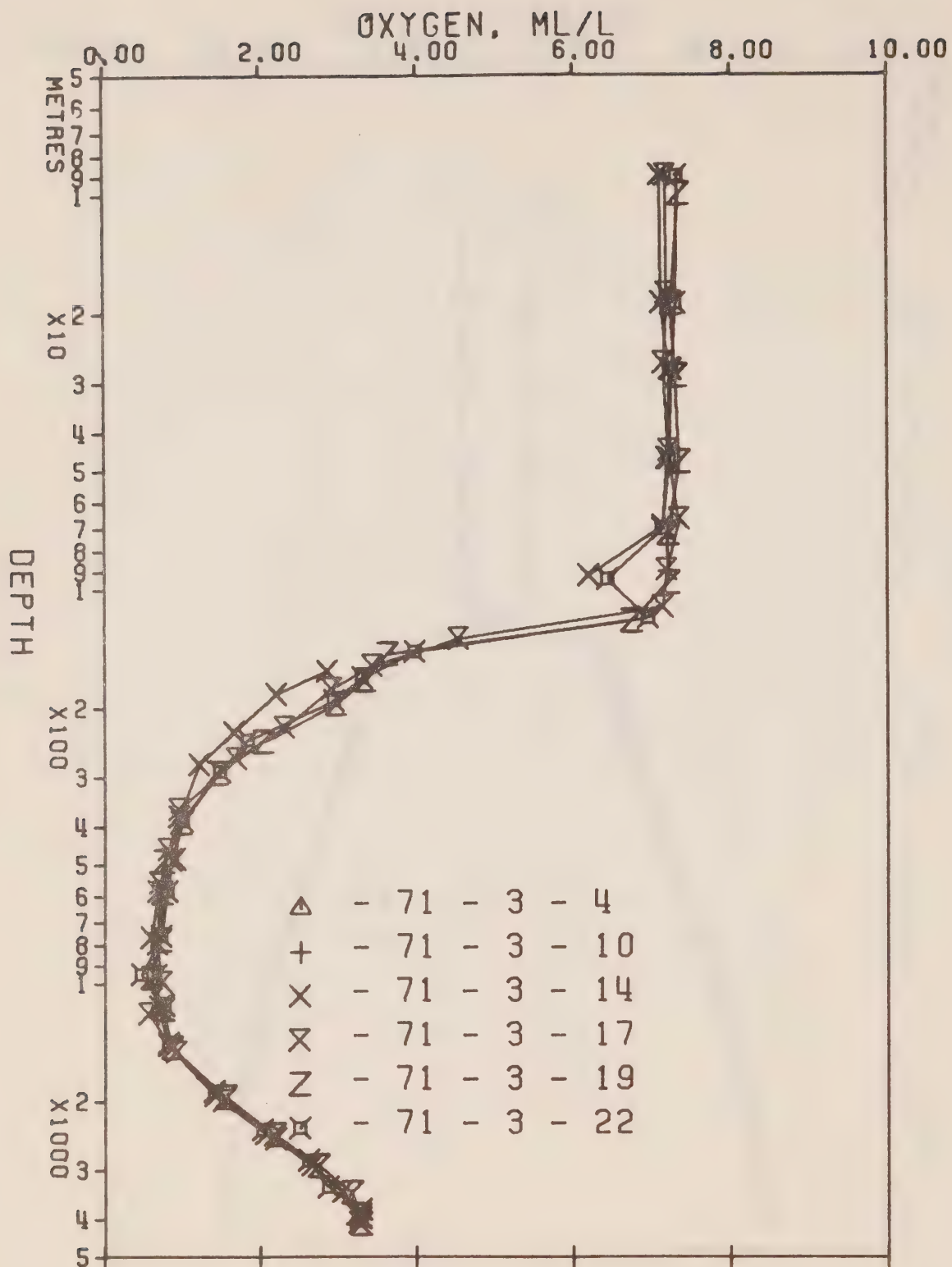


Fig. 23 Composite Plot of oxygen vs.  $\text{Log}_{10}$  Depth P-71-3.

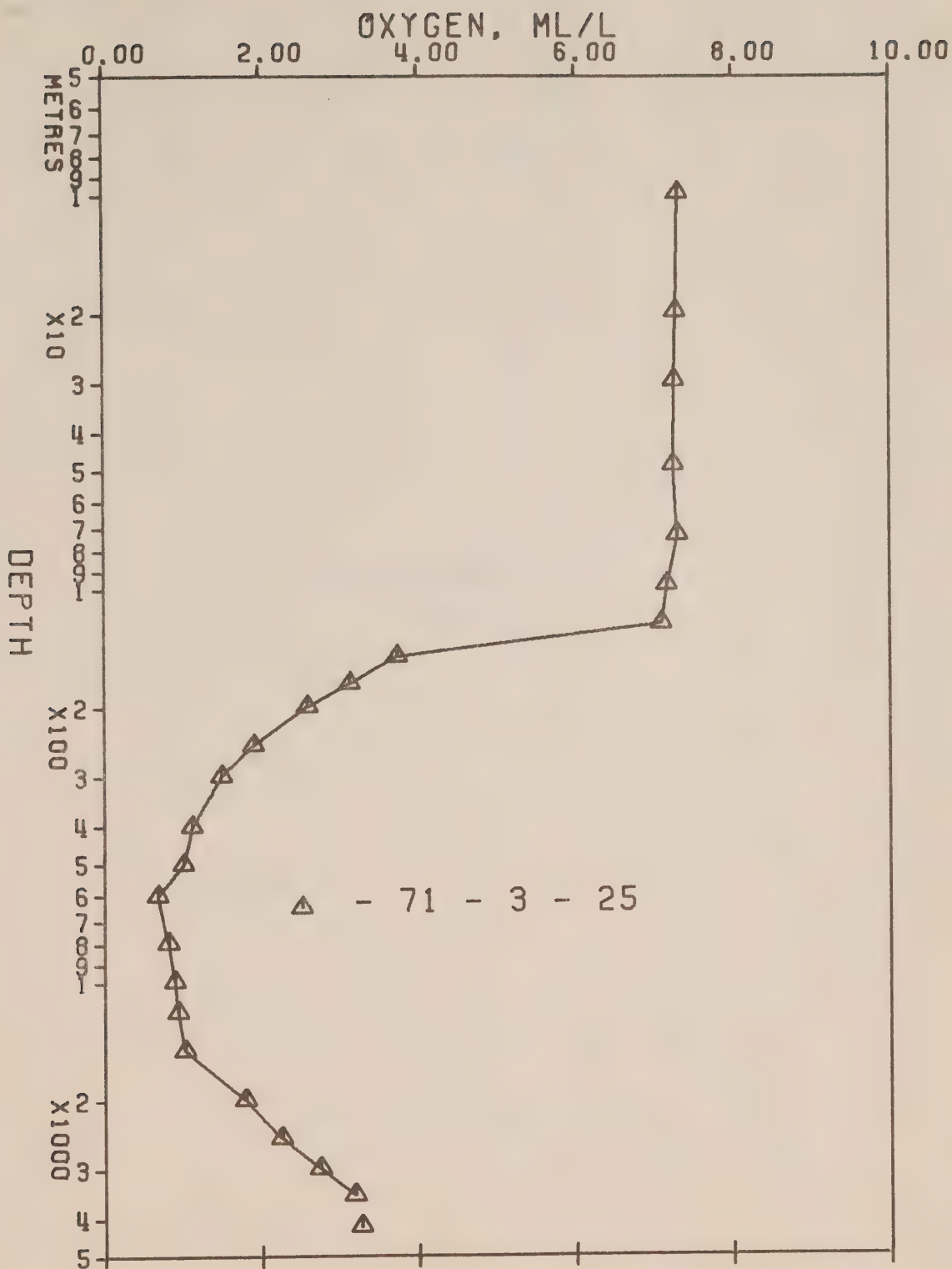
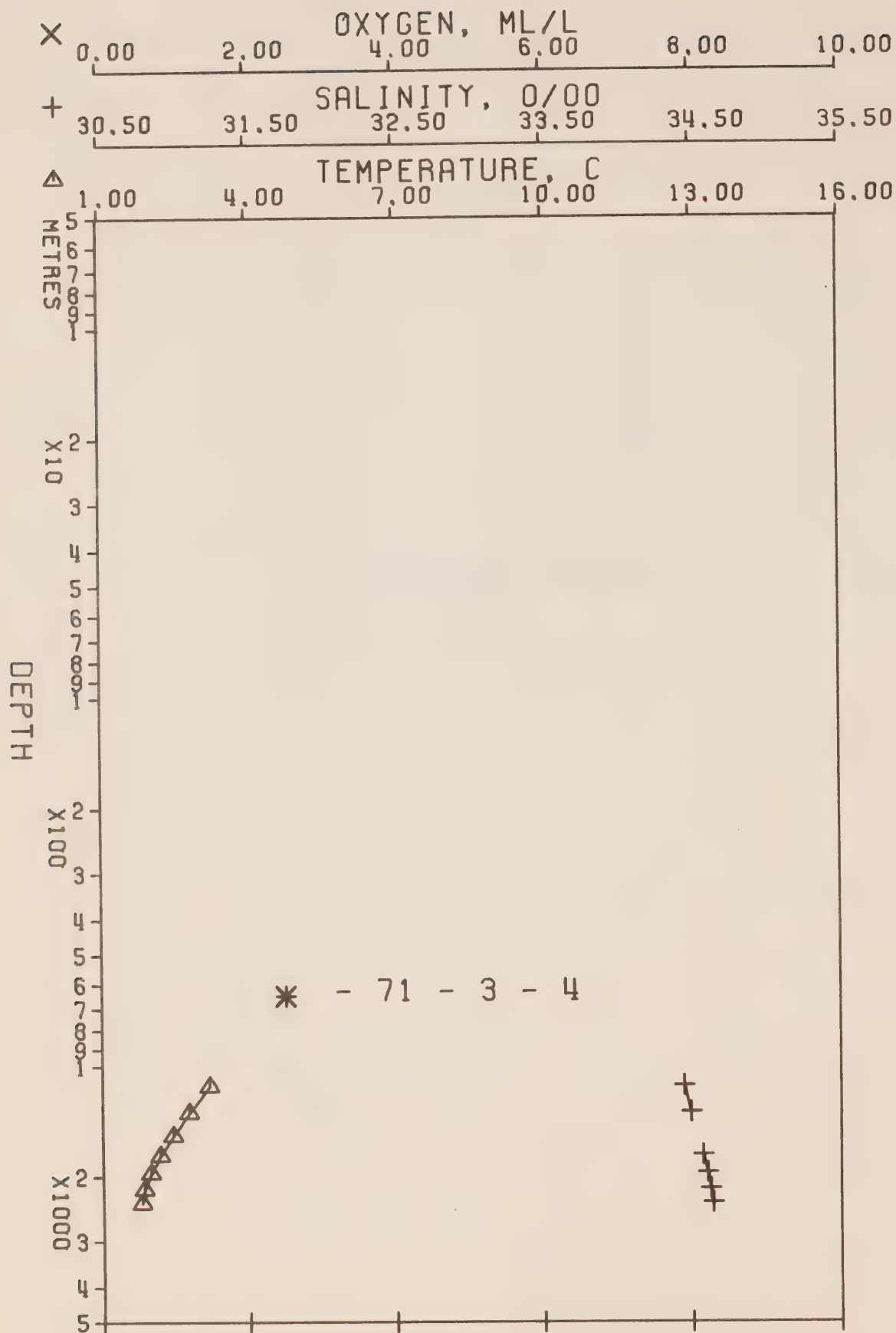


Fig. 24 Composite Plot of oxygen vs. Log<sub>10</sub> Depth P-71-3.



RESULTS OF BOTTLE CASTS

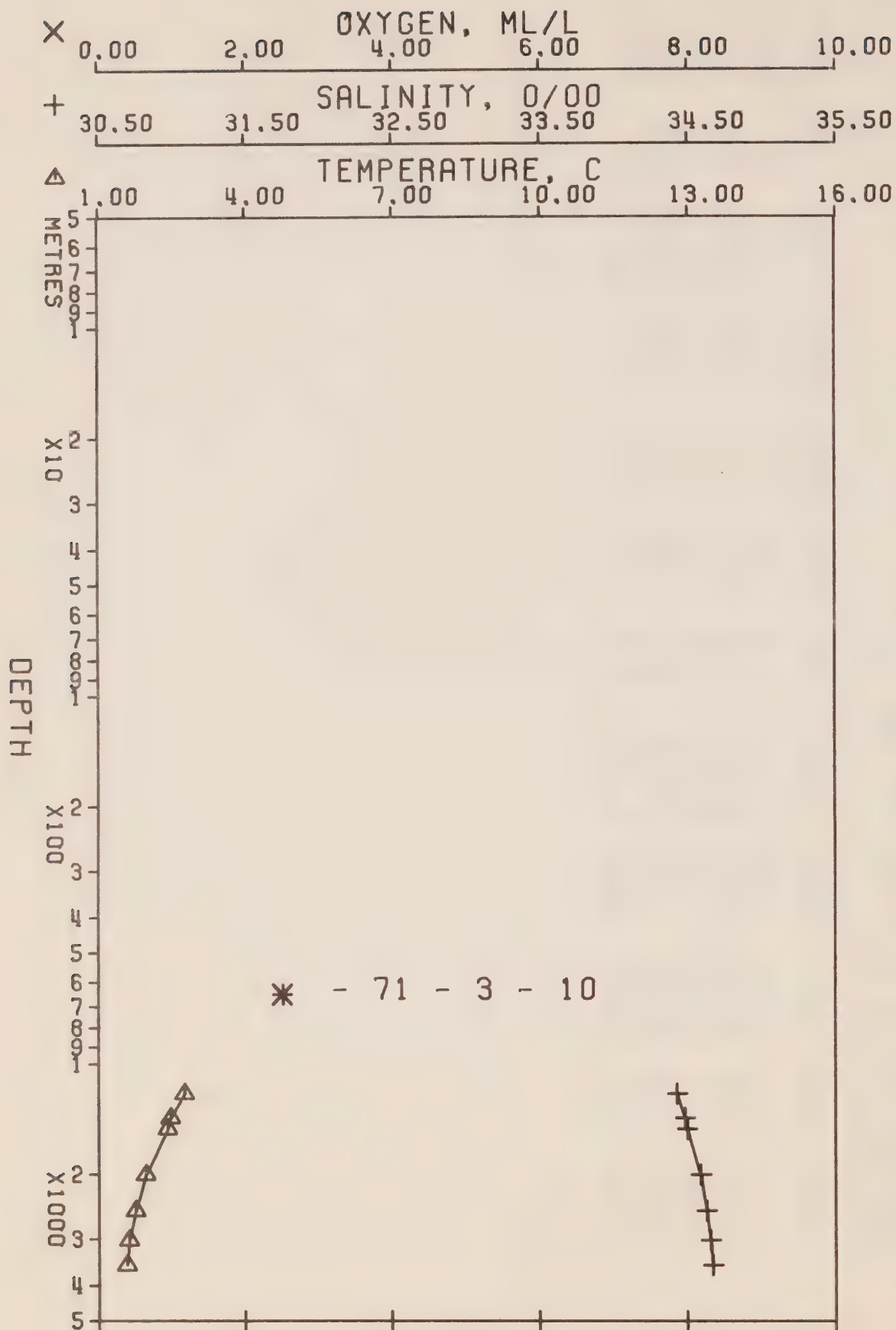
(P-71-3)



PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 4 DATE 3/ 4/71  
 POSITION 48-46.0 N, 127-40.0 W GMT 9.4  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
1147	3.18	34.444	1135	27.450	72.4	3.10	63.4	0.0	0.0	0.0	1481.
1353	2.75	34.490	1338	27.525	65.3	2.66	56.1	1.90	14.65	0.0	1483.
1561	2.43	34.531*	1543	27.586	59.8	2.32	50.3	3.20	33.93	0.0	1485.
1770	2.16	34.568	1749	27.637	54.9	2.04	45.4	4.40	54.24	0.0	1488.
1978	1.96	34.599	1954	27.678	51.1	1.82	41.5	5.50	75.27	0.0	1490.
2187	1.83	34.618	2159	27.703	48.8	1.68	39.0	6.54	97.32	0.0	1493.
2393	1.78	34.633	2361	27.719	47.9	1.61	37.3	7.53	120.51	0.0	1496.





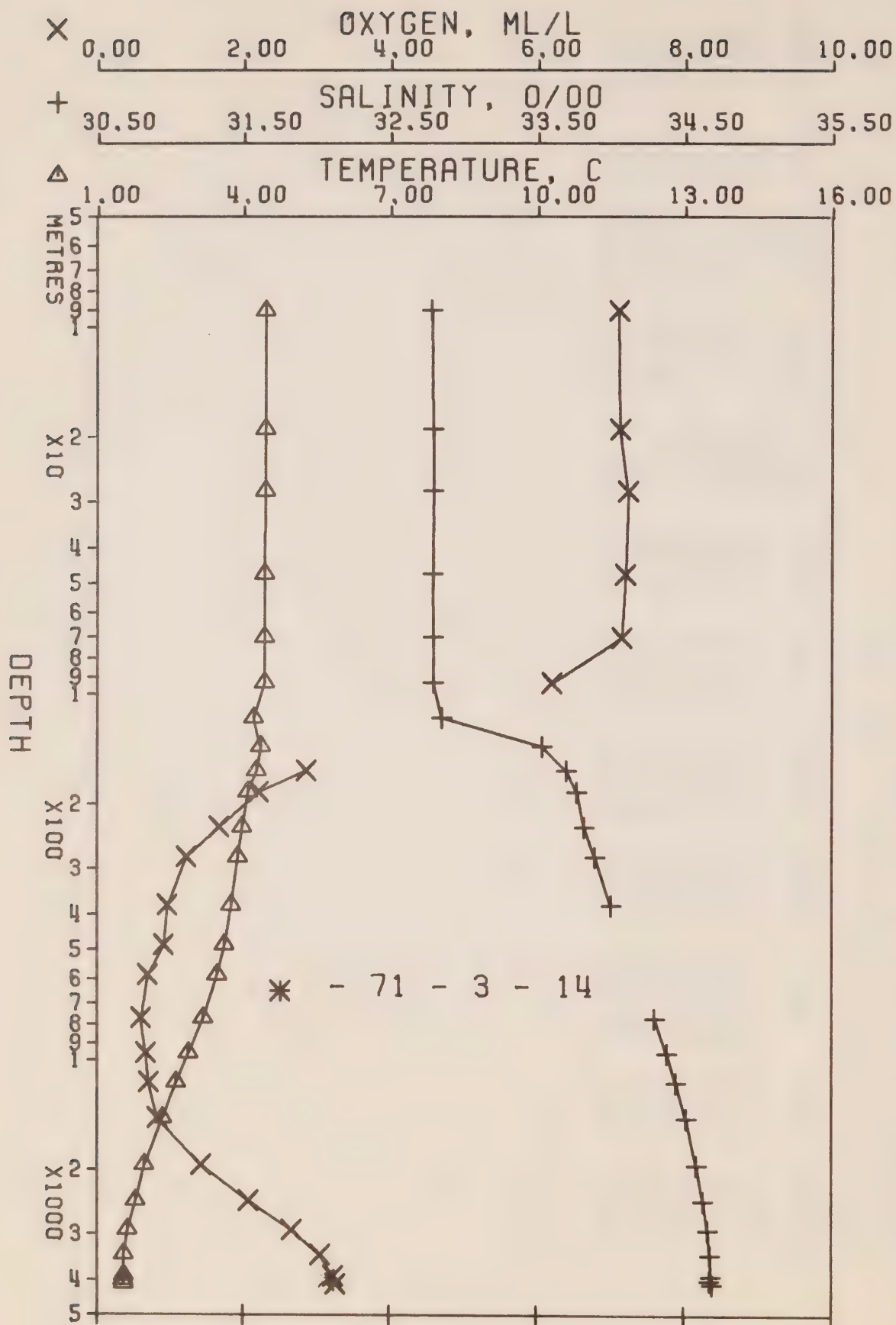
PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 10 DATE 4/ 4/71

POSITION 49-26.0 N, 136-40.0 W GMT 17.3

HYDROGRAPHIC CAST DATA

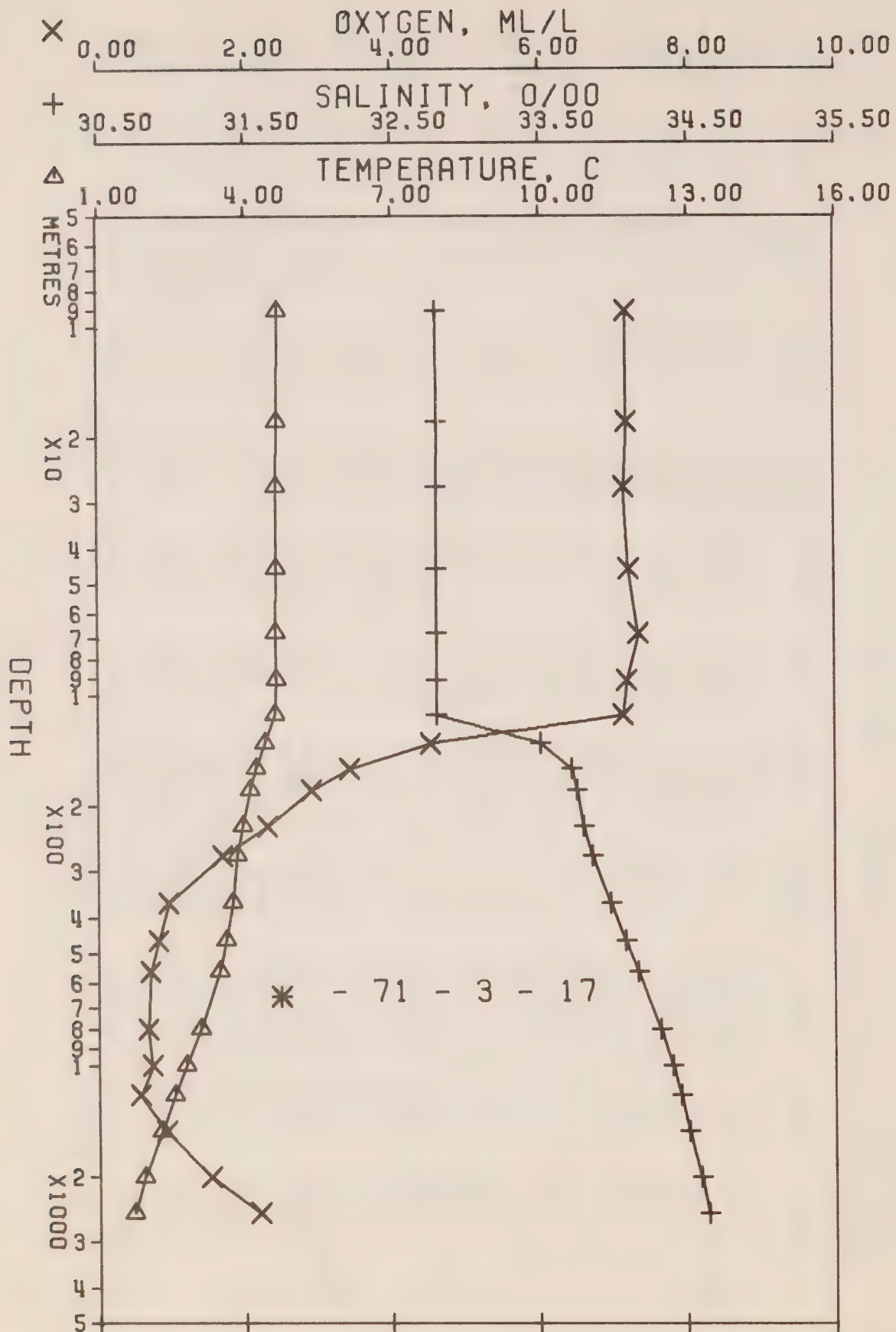
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
1216	2.74	34.428	1203	27.477	69.0	2.66	60.8	0.0	0.0	0.0	1481.
1418	2.46	34.483	1402	27.545	62.9	2.36	54.3	1.93	16.62	0.0	1483.
1519	2.39	34.501	1502	27.565	61.3	2.29	52.3	2.56	26.04	0.0	1484.
2026	1.95	34.588	2001	27.670	51.9	1.81	42.2	5.42	77.59	0.0	1491.
2539	1.73	34.631	2504	27.721	47.8	1.55	37.1	7.95	136.56	0.0	1499.
3056	1.60	34.656	3011	27.751	45.9	1.37	34.0	10.37	205.41	0.0	1507.
3583	1.55	34.672	3526	27.768	45.6	1.27	32.1	12.77	286.85	0.0	1516.



PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 14 DATE 6/ 4/71  
 POSITION 50- 0.0 N, 144-50.0 W GMT 20.4  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.41	32.798	0	26.020	199.9	4.41	199.7	0.0	0.0	7.19	1466.
9	4.44	32.786	9	26.008	201.2	4.44	200.9	0.18	0.01	7.10	1466.
19	4.43	32.794	19	26.015	200.6	4.43	200.2	0.38	0.04	7.12	1466.
28	4.43	32.794	28	26.015	200.7	4.43	200.2	0.57	0.08	7.23	1466.
47	4.42	32.792	47	26.014	200.8	4.42	200.2	0.95	0.23	7.19	1466.
70	4.42	32.794	70	26.016	200.9	4.41	200.0	1.41	0.51	7.14	1467.
94	4.42	32.795	93	26.017	201.0	4.41	199.9	1.88	0.90	6.19	1467.
117	4.20	32.855	116	26.087	194.4	4.19	193.2	2.35	1.40	0.0	1467.
140	4.34	33.535	139	26.612	145.0	4.33	143.4	2.74	1.91	0.0	1469.
163	4.25	33.700	162	26.752	131.9	4.24	130.1	3.06	2.40	2.85	1469.
186	4.08	33.769	185	26.824	125.1	4.07	123.3	3.35	2.93	2.20	1469.
233	3.95	33.822	231	26.880	120.2	3.93	117.9	3.92	4.14	1.66	1469.
280	3.87	33.894	278	26.945	114.4	3.85	111.7	4.47	5.59	1.21	1469.
380	3.73	34.006	377	27.048	105.4	3.70	101.9	5.57	9.27	0.95	1471.
488	3.59	34.105*	484	27.141	97.3	3.56	93.1	6.66	14.11	0.90	1472.
590	3.44	34.184*	585	27.218	90.6	3.40	85.7	7.62	19.37	0.68	1473.
773	3.16	34.298	766	27.335	80.5	3.11	74.4	9.18	30.21	0.59	1475.
968	2.86	34.387	959	27.433	71.9	2.79	65.1	10.66	43.37	0.66	1477.
1165	2.61	34.443	1153	27.500	66.2	2.53	58.7	12.02	58.08	0.70	1479.
1460	2.32	34.515	1444	27.582	59.2	2.22	50.8	13.86	82.73	0.82	1483.
1956	1.95	34.587	1932	27.669	51.7	1.82	42.3	16.58	130.10	1.42	1490.
2455	1.76	34.631	2422	27.719	48.0	1.59	37.3	19.05	185.73	2.07	1497.
2958	1.60	34.658	2915	27.753	45.5	1.38	33.9	21.40	250.37	2.66	1505.
3463	1.52	34.673	3409	27.771	44.8	1.25	31.9	23.67	324.68	3.05	1514.
3971	1.53	34.682	3905	27.777	45.6	1.21	30.9	25.94	410.94	3.23	1522.
4074	1.51	34.671	4005	27.770	46.4	1.18	31.6	26.42	430.34		1524.
4175	1.53	34.692	4104	27.785	45.5	1.19	30.0	26.88	450.01	3.26	1526.

\* Oxygen data suspect - Not archived

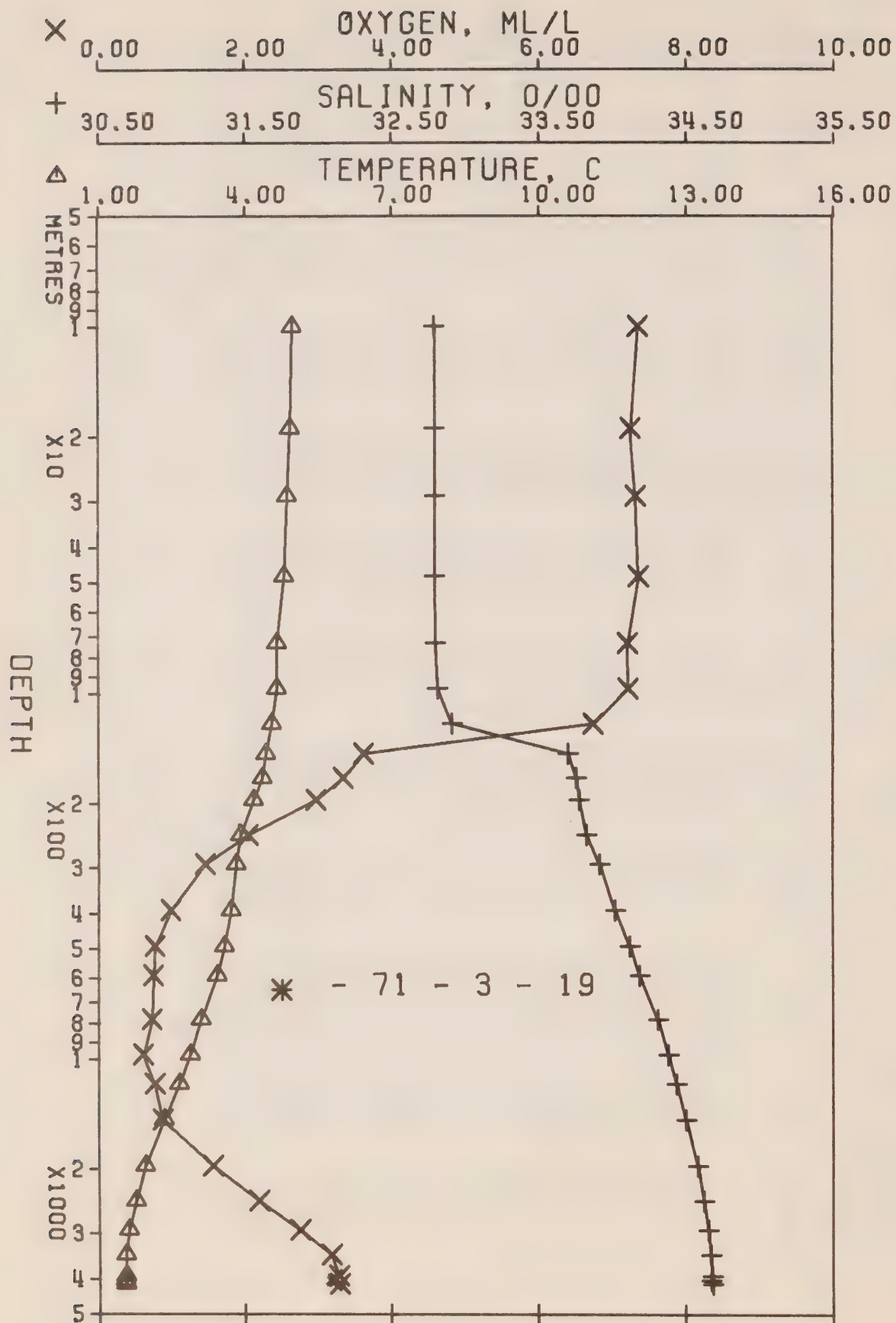




PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 17 DATE 22/ 4/71  
 POSITION 50- 0.0 N, 145- 0.0 W GMT 19.5  
 HYDROGRAPHIC CAST DATA

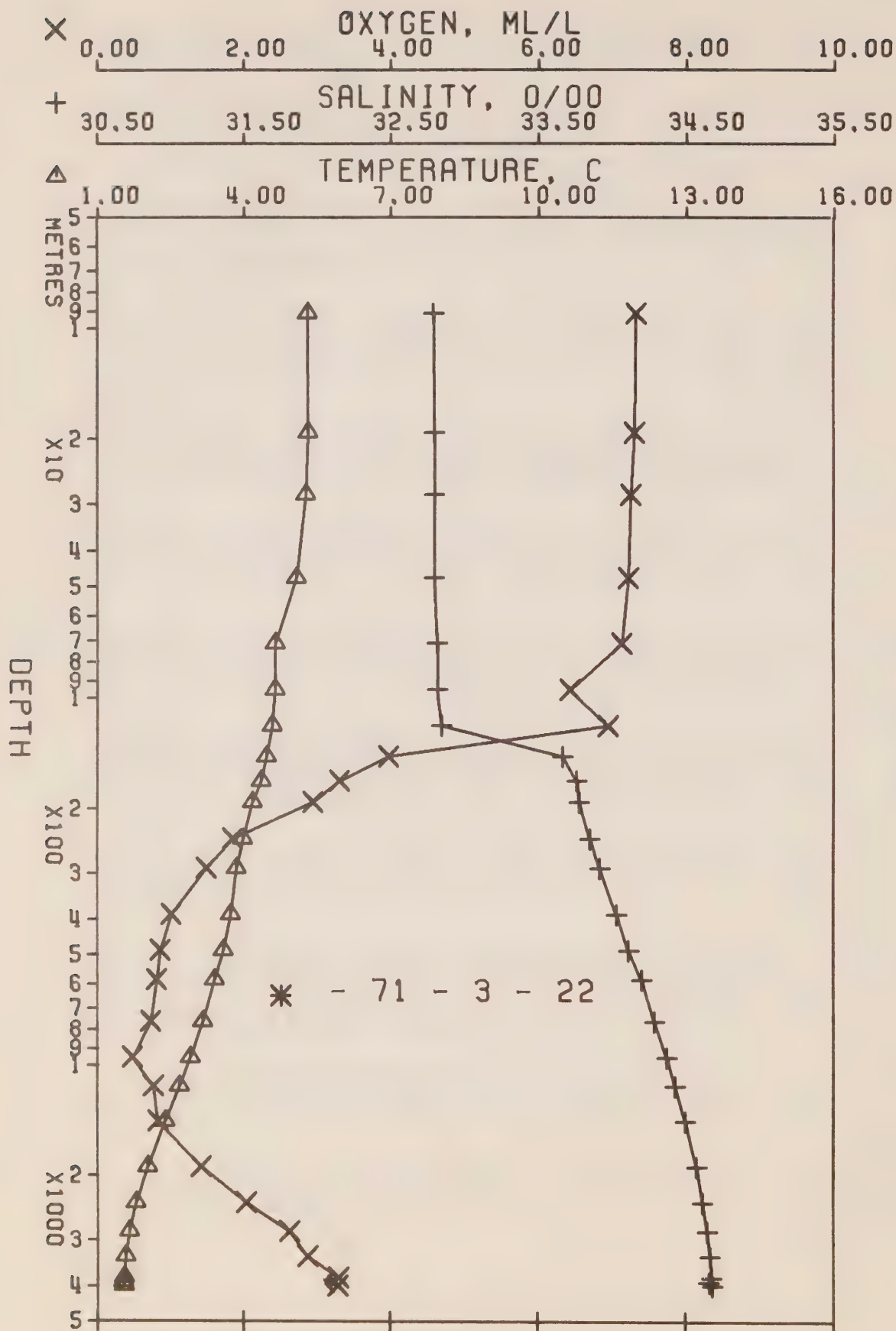
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	4.71	32.813	0	26.000	201.8	4.71	201.6	0.0	0.0	7.23	1467.
9	4.68	32.811	9	26.002	201.8	4.68	201.4	0.18	0.01	7.18	1467.
18	4.66	32.814	18	26.006	201.4	4.66	201.0	0.37	0.03	7.19	1467.
27	4.65	32.810	27	26.004	201.7	4.65	201.2	0.55	0.08	7.15	1467.
45	4.64	32.810	45	26.005	201.7	4.64	201.0	0.91	0.21	7.22	1467.
67	4.63	32.810	67	26.006	201.8	4.63	200.9	1.36	0.47	7.35	1468.
91	4.64	32.810	90	26.005	202.1	4.63	201.0	1.83	0.84	7.19	1468.
113	4.62	32.811	112	26.008	202.0	4.61	200.8	2.28	1.32	7.14	1468.
135	4.40	33.515	134	26.590	147.0	4.39	145.5	2.67	1.81	4.53	1469.
158	4.23	33.725	157	26.774	129.7	4.22	128.1	2.99	2.27	3.43	1469.
180	4.11	33.759	179	26.813	126.2	4.10	124.3	3.27	2.76	2.91	1469.
226	3.96	33.804	224	26.864	121.6	3.94	119.4	3.83	3.92	2.31	1469.
272	3.84	33.864	270	26.924	116.3	3.82	113.7	4.38	5.32	1.69	1469.
365	3.74	33.992	362	27.036	106.4	3.71	103.1	5.41	8.67	0.95	1470.
462	3.61	34.089	458	27.126	98.6	3.58	94.5	6.40	12.85	0.81	1472.
562	3.47	34.176	557	27.209	91.3	3.43	86.6	7.35	17.79	0.70	1473.
803	3.09	34.324	796	27.362	78.0	3.04	71.9	9.38	31.92	0.67	1475.
1007	2.79	34.404	997	27.453	70.1	2.72	63.3	10.88	45.76	0.73	1477.
1210	2.55	34.460	1198	27.519	64.5	2.47	56.9	12.25	61.20	0.56	1480.
1517	2.28	34.517	1500	27.587	58.9	2.18	50.3	14.13	87.37	0.92	1484.
2028	1.92	34.593	2003	27.676	51.2	1.78	41.6	16.93	137.90	1.53	1491.
2540	1.70	34.646	2506	27.736	46.4	1.52	35.7	19.42	195.82	2.20	1499.





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 19 DATE 26/ 4/71  
 POSITION 49-59.0 N, 145- 4.0 W GMT 19.8  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.25	32.802	0	25.932	208.3	5.25	208.1	0.0	0.0	7.36	1469.
10	4.96	32.801	10	25.963	205.4	4.96	205.1	0.21	0.01	7.35	1468.
19	4.91	32.800	19	25.968	205.0	4.91	204.7	0.39	0.04	7.25	1468.
29	4.85	32.799	29	25.974	204.6	4.85	204.1	0.60	0.09	7.32	1468.
48	4.79	32.802	48	25.983	203.8	4.79	203.2	0.99	0.24	7.36	1468.
73	4.65	32.807	73	26.002	202.2	4.64	201.4	1.50	0.56	7.21	1468.
98	4.64	32.821	97	26.014	201.3	4.63	200.2	1.99	0.99	7.22	1468.
122	4.54	32.922	121	26.105	192.9	4.53	191.6	2.48	1.53	6.74	1468.
147	4.42	33.705	146	26.738	133.2	4.41	131.4	2.89	2.09	3.62	1469.
171	4.34	33.761	170	26.791	128.3	4.33	126.4	3.19	2.59	3.34	1469.
196	4.17	33.778	195	26.822	125.5	4.16	123.5	3.51	3.19	2.97	1469.
246	3.89	33.832	244	26.894	119.0	3.87	116.7	4.12	4.55	2.04	1469.
295	3.81	33.920	293	26.972	112.0	3.79	109.2	4.69	6.12	1.45	1469.
395	3.70	34.024	392	27.065	103.8	3.67	100.3	5.76	9.90	0.98	1471.
495	3.56	34.123	491	27.158	95.8	3.53	91.4	6.76	14.42	0.76	1472.
596	3.42	34.192	591	27.226	89.9	3.38	84.9	7.69	19.63	0.74	1473.
784	3.08	34.317	777	27.358	78.3	3.03	72.4	9.27	30.70	0.72	1475.
982	2.86	34.383	972	27.430	72.3	2.79	65.4	10.75	44.01	0.60	1477.
1180	2.63	34.438	1168	27.494	66.9	2.55	59.2	12.13	59.22	0.76	1480.
1477	2.32	34.507	1461	27.576	59.8	2.22	51.4	14.00	84.63	0.87	1483.
1975	1.93	34.587	1951	27.671	51.5	1.79	42.2	16.75	132.84	1.56	1490.
2476	1.73	34.627	2443	27.718	48.0	1.55	37.4	19.22	189.04	2.19	1498.
2978	1.59	34.654	2935	27.750	45.7	1.37	34.2	21.56	254.17	2.75	1506.
3482	1.52	34.672	3428	27.770	44.9	1.25	32.0	23.84	329.03	3.18	1514.
3989	1.53	34.678	3922	27.774	45.9	1.21	31.2	26.13	416.19	3.28	1523.
4089	1.51	34.672	4020	27.771	46.3	1.18	31.5	26.59	435.30		1524.
4191	1.53	34.683	4119	27.778	46.1	1.18	30.7	27.06	455.15	3.29	1526.

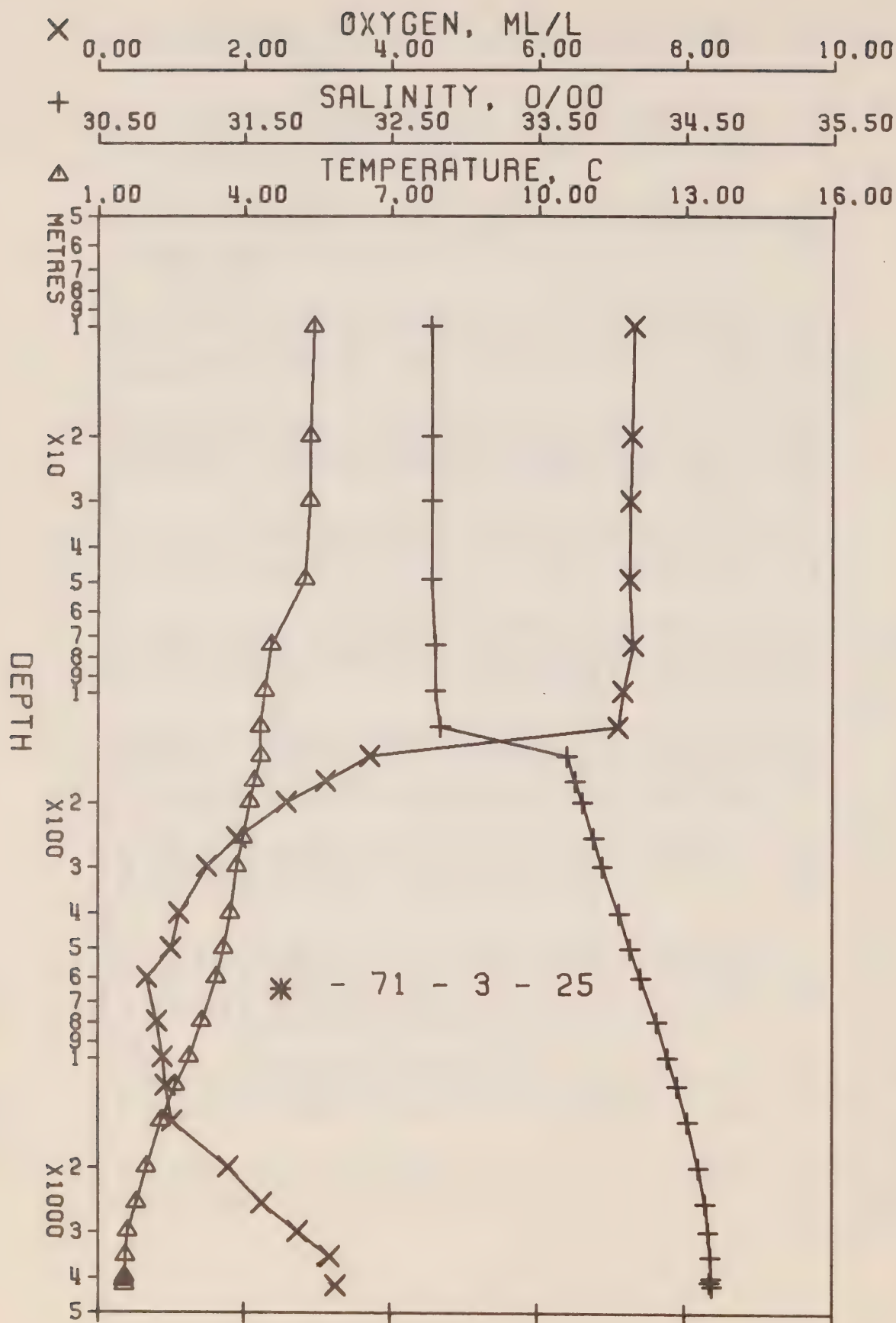


PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 22 DATE 3/ 5/71  
 POSITION 50- 0.0 N, 145- 2.0 W GMT 19.9  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.41	32.804	0	25.915	209.9	5.41	209.7	0.0	0.0	7.31	1470.
9	5.29	32.797	9	25.923	209.2	5.29	208.9	0.19	0.01	7.32	1469.
19	5.30	32.799	19	25.923	209.3	5.30	208.9	0.40	0.04	7.30	1470.
28	5.26	32.799	28	25.928	209.0	5.26	208.5	0.59	0.08	7.25	1470.
47	5.07	32.799	47	25.950	207.0	5.07	206.4	0.99	0.24	7.22	1469.
71	4.63	32.818	71	26.013	201.2	4.62	200.4	1.48	0.54	7.13	1468.
96	4.63	32.818	95	26.013	201.4	4.62	200.3	1.97	0.95	6.43	1468.
120	4.57	32.848	119	26.043	198.8	4.56	197.5	2.46	1.49	6.95	1468.
145	4.45	33.668	144	26.706	136.2	4.44	134.6	2.88	2.06	3.97	1469.
169	4.34	33.767	168	26.796	127.8	4.33	126.0	3.19	2.56	3.30	1469.
193	4.17	33.779	192	26.823	125.3	4.16	123.4	3.50	3.12	2.94	1469.
243	3.97	33.855	241	26.904	118.1	3.95	115.7	4.10	4.46	1.84	1469.
292	3.84	33.919	290	26.968	112.4	3.82	109.5	4.67	6.01	1.48	1469.
392	3.71	34.033	389	27.071	103.3	3.68	99.7	5.74	9.76	1.00	1471.
491	3.56	34.117	487	27.153	96.2	3.53	91.9	6.73	14.20	0.85	1472.
589	3.39	34.204	584	27.239	88.6	3.35	83.8	7.63	19.17	0.80	1473.
769	3.14	34.291	762	27.331	80.7	3.09	74.8	9.15	29.67	0.72	1475.
960	2.89	34.375	951	27.421	73.0	2.82	66.2	10.61	42.59	0.47	1477.
1152	2.66	34.430	1140	27.485	67.6	2.58	60.1	11.96	57.05	0.76	1479.
1439	2.36	34.498	1423	27.565	60.7	2.26	52.4	13.79	81.27	0.82	1483.
1918	2.00	34.574	1895	27.655	53.1	1.87	43.6	16.50	127.55	1.41	1489.
2399	1.76	34.616	2367	27.707	48.8	1.59	38.5	18.93	181.12	2.03	1496.
2881	1.63	34.646	2840	27.741	46.6	1.42	35.1	21.22	242.80	2.62	1504.
3369	1.55	34.664	3317	27.761	45.6	1.29	32.8	23.46	314.13	2.87	1512.
3861	1.53	34.676	3798	27.772	45.8	1.22	31.5	25.67	395.55	3.29	1520.
3961	1.51	34.655	3895	27.757	47.2	1.19	32.9	26.14	414.04		1522.
4060	1.52	34.679	3992	27.775	45.9	1.19	31.0	26.60	433.04	3.28	1524.

\* Oxygen data suspect - Not archived





# PACIFIC OCEANOGRAPHIC GROUP

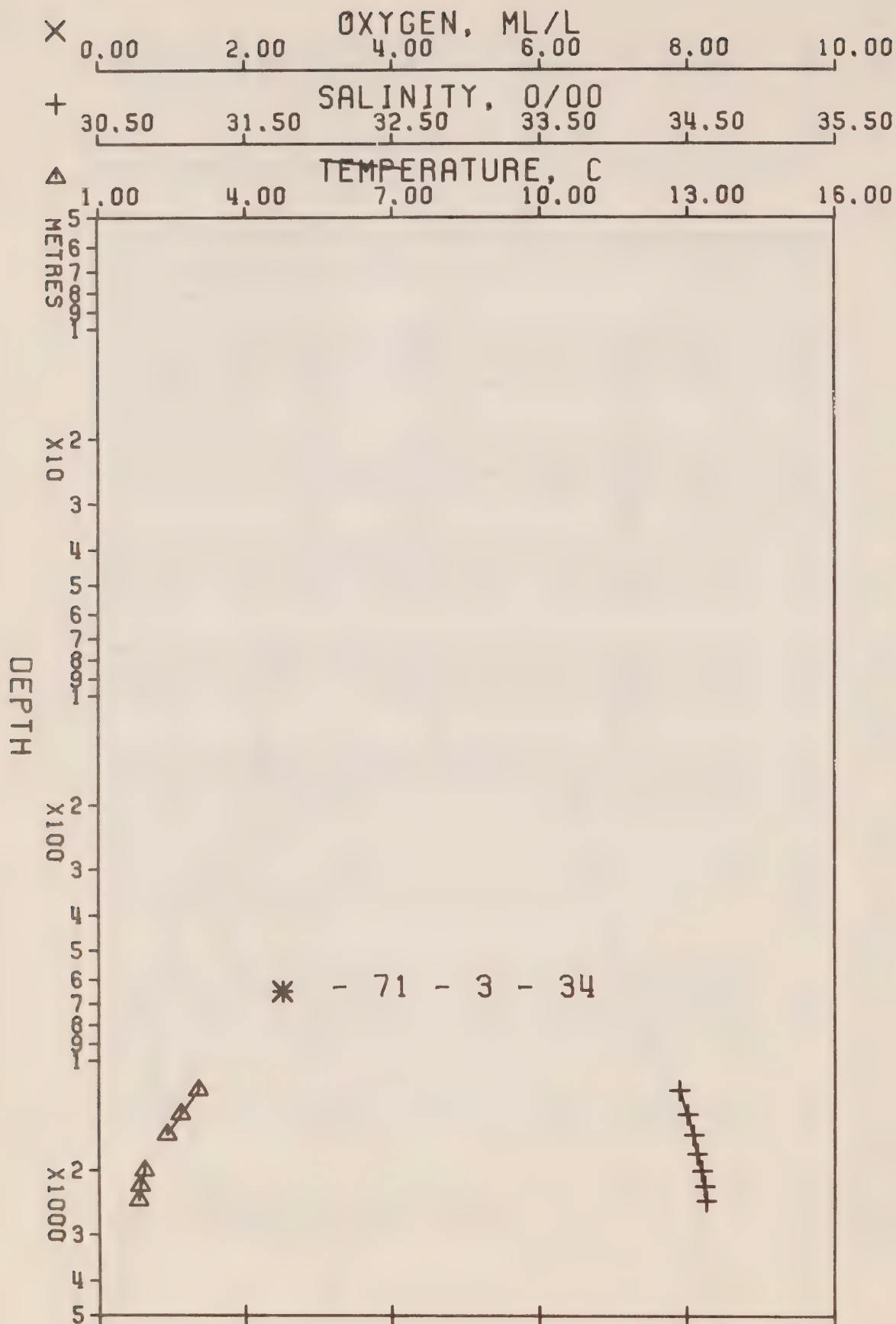
REFERENCE NO. 71- 3- 25 DATE 11/ 5/71

POSITION 50- 0.0 N, 145- 0.0 W GMT 0.8

## HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.77	32.786	0	25.858	215.3	5.77	215.1	0.0	0.0	7.23	1471.
10	5.41	32.782	10	25.897	211.7	5.41	211.4	0.21	0.01	7.30	1470.
20	5.34	32.780	20	25.904	211.1	5.34	210.7	0.43	0.04	7.27	1470.
30	5.33	32.780	30	25.905	211.2	5.33	210.6	0.64	0.10	7.25	1470.
49	5.23	32.780	49	25.916	210.2	5.23	209.5	1.04	0.26	7.24	1470.
74	4.54	32.804	74	26.011	201.4	4.53	200.5	1.56	0.59	7.29	1467.
100	4.40	32.807	99	26.028	199.9	4.39	198.9	2.07	1.04	7.15	1467.
125	4.32	32.841	124	26.064	196.8	4.31	195.5	2.58	1.62	7.08	1467.
150	4.33	33.701	149	26.744	132.5	4.32	130.9	2.99	2.20	3.71	1469.
175	4.20	33.753	174	26.799	127.5	4.19	125.6	3.31	2.73	3.11	1469.
200	4.10	33.803	199	26.849	122.9	4.09	120.8	3.62	3.33	2.57	1469.
251	3.95	33.878	249	26.924	116.1	3.93	113.8	4.23	4.71	1.89	1469.
301	3.83	33.941	299	26.986	110.6	3.81	107.8	4.80	6.32	1.48	1470.
403	3.70	34.054	400	27.089	101.6	3.67	98.0	5.87	10.19	1.10	1471.
505	3.56	34.131	501	27.164	95.2	3.52	90.8	6.88	14.83	0.99	1472.
606	3.41	34.201	601	27.234	89.2	3.37	84.1	7.81	20.11	0.66	1473.
800	3.11	34.308	793	27.348	79.4	3.06	73.3	9.44	31.78	0.80	1475.
1002	2.86	34.385	992	27.432	72.2	2.79	65.2	10.96	45.77	0.88	1478.
1203	2.58	34.452	1191	27.510	65.4	2.50	57.7	12.34	61.32	0.92	1480.
1507	2.28	34.519	1490	27.589	58.7	2.18	50.1	14.21	87.13	1.01	1484.
2014	1.98	34.593	1989	27.672	51.9	1.84	42.0	16.99	137.00	1.78	1491.
2523	1.77	34.638	2489	27.724	47.9	1.59	36.9	19.52	195.48	2.24	1499.
3034	1.59	34.662	2990	27.757	45.3	1.37	33.4	21.89	262.55	2.73	1507.
3546	1.54	34.674	3490	27.770	45.2	1.26	31.9	24.19	339.89	3.17	1515.
4058	1.53	34.682	3990	27.777	45.9	1.20	30.9	26.50	429.35		1524.
4161	1.51	34.667	4090	27.767	46.9	1.17	31.8	26.98	449.33		1525.
4264	1.53	34.683	4190	27.778	46.3	1.18	30.6	27.46	469.91	3.25	1527.





PACIFIC OCEANOGRAPHIC GROUP  
 REFERENCE NO. 71- 3- 34 DATE 19/ 5/71  
 POSITION 48-46.0 N, 127-40.0 W GMT 13.9  
 HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
1216	3.02	34.452	1203	27.471	70.4	2.93	61.3	0.0	0.0	0.0	1482.
1415	2.66	34.505	1400	27.545	63.5	2.56	54.2	1.86	15.29	0.0	1484.
1615	2.38	34.543	1597	27.599	58.5	2.27	49.1	3.07	34.09	0.0	1486.
1818	2.12*	34.571	1796	27.643	54.4	2.00	44.8	4.21	54.03	0.0	1488.
2023	1.92	34.599	1998	27.681	50.8	1.78	41.1	5.29	75.12	0.0	1491.
2233	1.82	34.620	2204	27.706	48.8	1.66	38.8	6.33	97.67	0.0	1494.
2446	1.80	34.632	2413	27.717	48.4	1.63	37.5	7.36	122.29	0.0	1497.



RESULTS OF STD CASTS

(P-71-3)

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 1

DATE 3/ 4/71

POSITION 48-38.0N, 126- 0.0W GMT 1.5

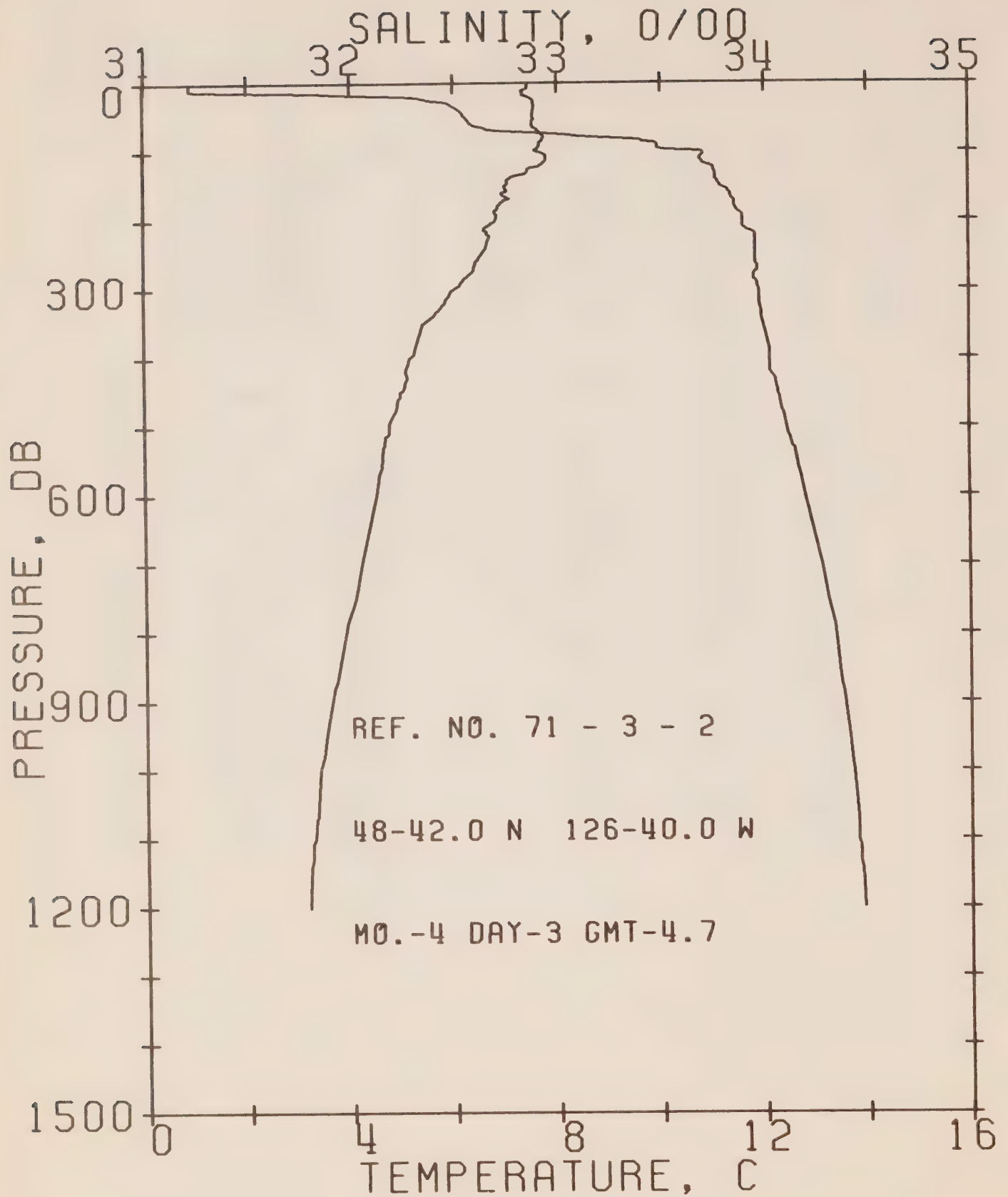
RESULTS OF STP CAST 38 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.62	30.98	0	24.20	372.9	0.0	0.0	1476.
10	7.34	31.08	10	24.32	362.2	0.37	0.02	1475.
20	7.45	31.36	20	24.52	342.8	0.72	0.07	1476.
30	7.42	31.94	30	24.98	299.2	1.05	0.15	1477.
50	7.40	32.52	50	25.44	256.0	1.60	0.38	1478.
75	7.38	32.66	75	25.55	245.6	2.23	0.78	1479.
100	7.34	32.90	99	25.74	227.6	2.81	1.30	1479.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	7.62	30.98	47.	7.42	32.43
2.	7.62	30.98	50.	7.40	32.52
2.	7.52	30.98	55.	7.38	32.56
3.	7.43	30.98	60.	7.38	32.60
5.	7.41	30.98	61.	7.38	32.61
6.	7.35	31.02	65.	7.38	32.62
10.	7.34	31.08	71.	7.38	32.64
15.	7.34	31.14	75.	7.38	32.66
18.	7.40	31.20	77.	7.38	32.68
20.	7.45	31.36	80.	7.38	32.74
22.	7.46	31.41	83.	7.38	32.80
23.	7.45	31.52	85.	7.35	32.82
25.	7.45	31.60	90.	7.36	32.85
30.	7.42	31.94	93.	7.36	32.85
33.	7.41	32.03	93.	7.36	32.88
38.	7.54	32.23	95.	7.35	32.88
40.	7.54	32.28	98.	7.35	32.88
43.	7.50	32.34	100.	7.34	32.90
45.	7.45	32.38	105.	7.34	32.90







PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 2

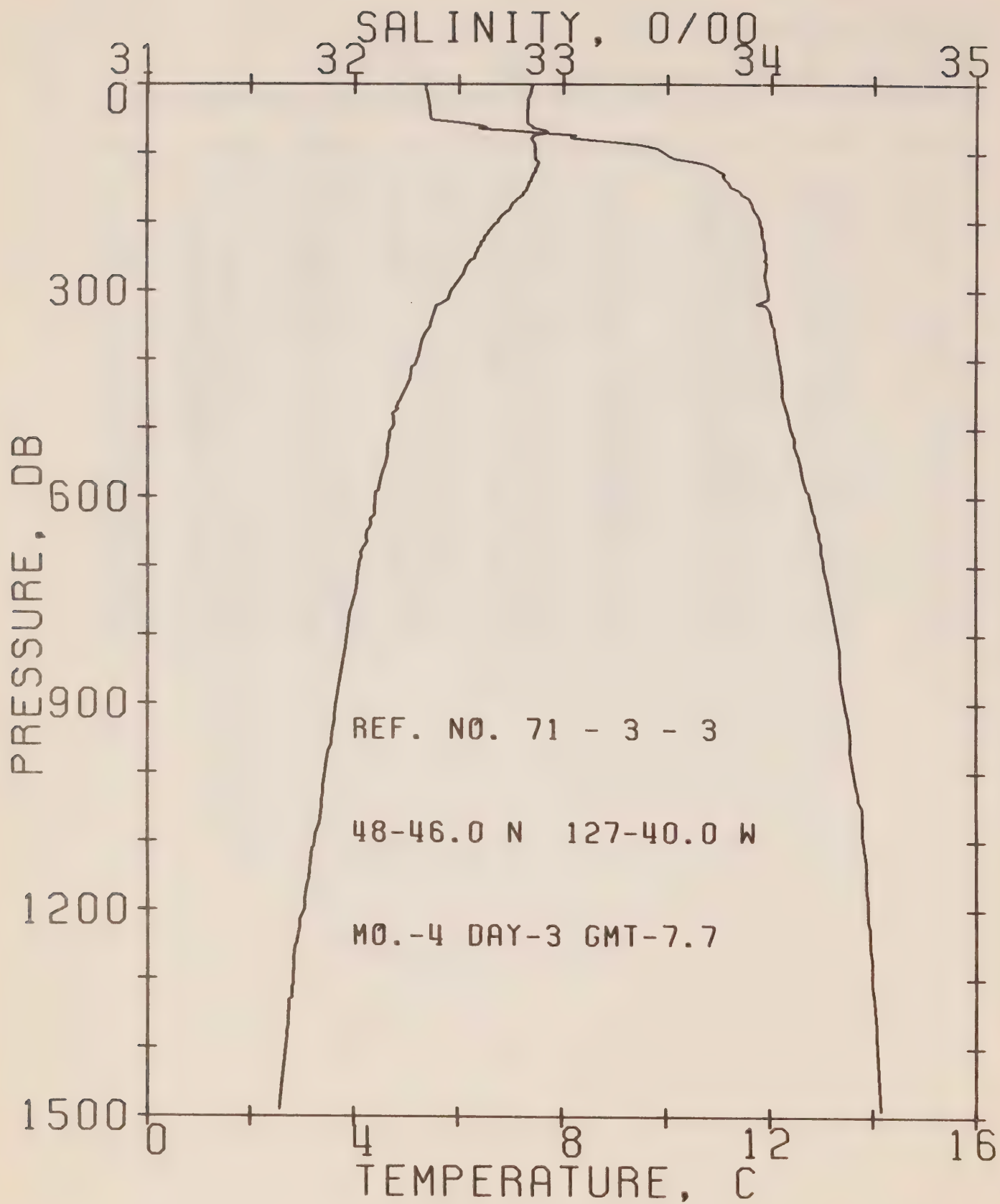
DATE 3/ 4/71

POSITION 48-42.0N, 126-40.0W

GMT 4.7

RESULTS OF STP CAST 145 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.45	31.22	0	24.41	352.7	0.0	0.0	1476.
10	7.39	31.22	10	24.42	352.4	0.35	0.02	1476.
20	7.46	32.30	20	25.26	272.8	0.66	0.06	1478.
30	7.56	32.49	30	25.39	260.0	0.93	0.13	1478.
50	7.54	32.57	50	25.46	254.1	1.44	0.34	1479.
75	7.75	33.04	75	25.80	222.3	2.06	0.73	1481.
100	7.64	33.70	99	26.33	172.1	2.54	1.17	1481.
125	7.47	33.76	124	26.40	165.7	2.98	1.66	1481.
150	6.99	33.79	149	26.49	157.4	3.38	2.23	1480.
175	6.95	33.86	174	26.55	151.9	3.77	2.86	1480.
200	6.84	33.90	199	26.60	147.9	4.14	3.58	1480.
225	6.72	33.96	223	26.66	142.2	4.50	4.36	1480.
250	6.56	33.96	248	26.68	140.4	4.85	5.21	1480.
300	6.03	33.98	298	26.77	132.9	5.54	7.14	1479.
400	5.16	34.03	397	26.91	119.6	6.80	11.62	1477.
500	4.76	34.11	496	27.02	109.8	7.95	16.89	1477.
600	4.51	34.20	595	27.12	101.4	9.00	22.77	1478.
800	3.90	34.35	793	27.30	85.4	10.87	36.01	1479.
1000	3.37	34.43	991	27.42	74.6	12.47	50.66	1480.
1200	3.13	34.48	1188	27.48	69.6	13.91	66.78	1482.



PACIFIC OCEANOGRAPHIC GROUP

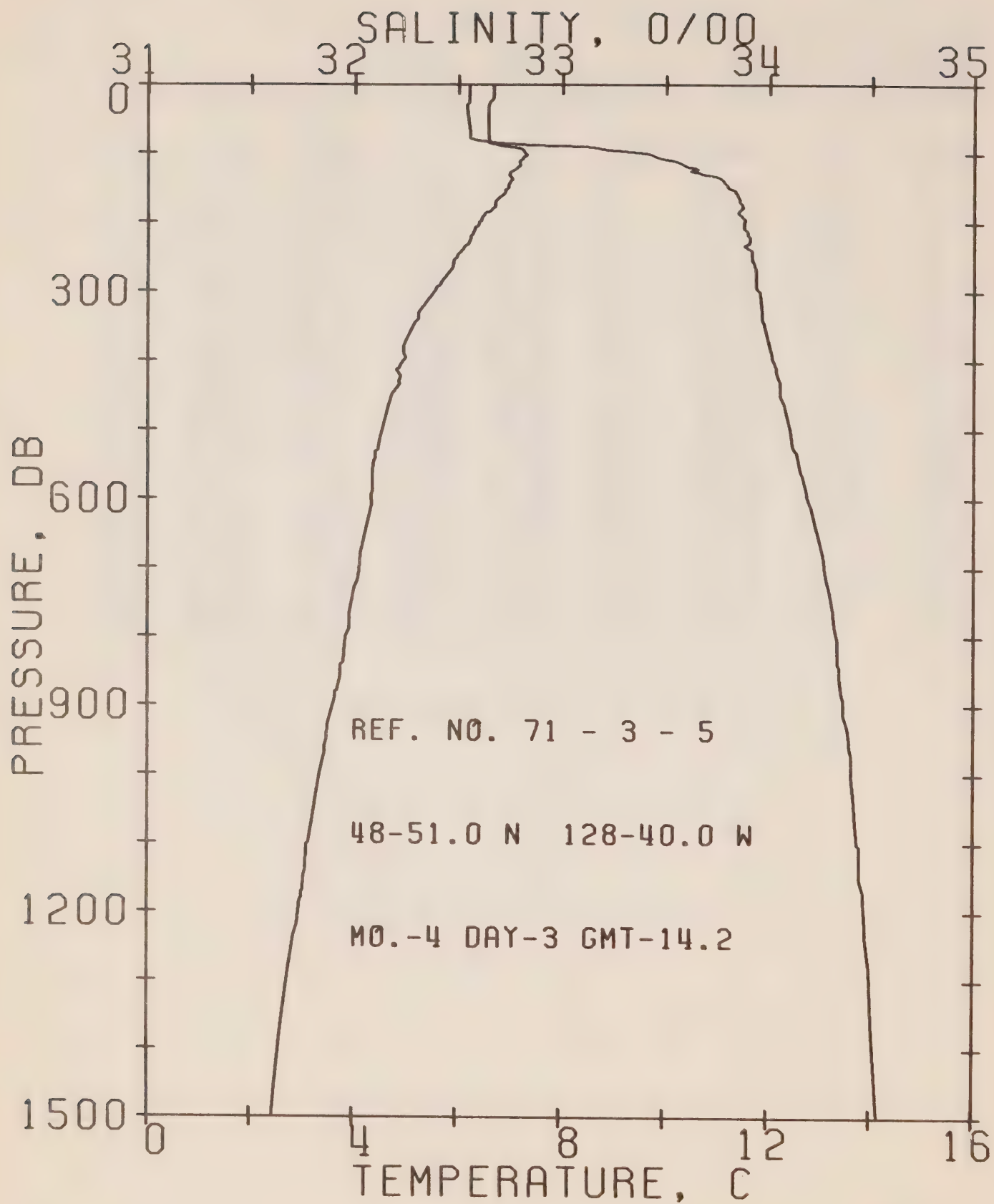
REFERENCE NO. 71- 3- 3

DATE 3/ 4/71

POSITION 48-46.0N, 127-40.0W GMT 7.7

RESULTS OF STP CAST 140 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.42	32.34	0	25.29	268.7	0.0	0.0	1477.
10	7.40	32.35	10	25.30	268.1	0.27	0.01	1477.
20	7.35	32.36	20	25.32	267.1	0.54	0.05	1477.
30	7.33	32.36	30	25.32	266.5	0.80	0.12	1477.
50	7.32	32.37	50	25.33	266.1	1.34	0.34	1478.
75	7.45	33.06	75	25.86	216.5	1.95	0.73	1479.
100	7.48	33.49	99	26.19	185.1	2.45	1.17	1481.
125	7.49	33.75	124	26.39	166.7	2.89	1.67	1481.
150	7.34	33.82	149	26.46	160.0	3.29	2.24	1481.
175	7.05	33.91	174	26.58	149.5	3.68	2.88	1481.
200	6.78	33.95	199	26.65	143.4	4.05	3.58	1480.
225	6.51	33.97	223	26.70	138.9	4.40	4.34	1479.
250	6.34	33.98	248	26.73	136.1	4.74	5.17	1479.
300	5.88	33.99	298	26.79	130.3	5.41	7.04	1478.
400	5.23	34.04	397	26.92	119.4	6.65	11.48	1477.
500	4.74	34.10	496	27.02	110.3	7.80	16.74	1477.
600	4.42	34.20	595	27.13	100.7	8.86	22.66	1477.
800	3.87	34.33	793	27.29	86.3	10.72	35.91	1479.
1000	3.46	34.41	991	27.39	77.2	12.36	50.92	1480.
1200	3.07	34.48	1188	27.49	68.8	13.81	67.09	1482.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 5

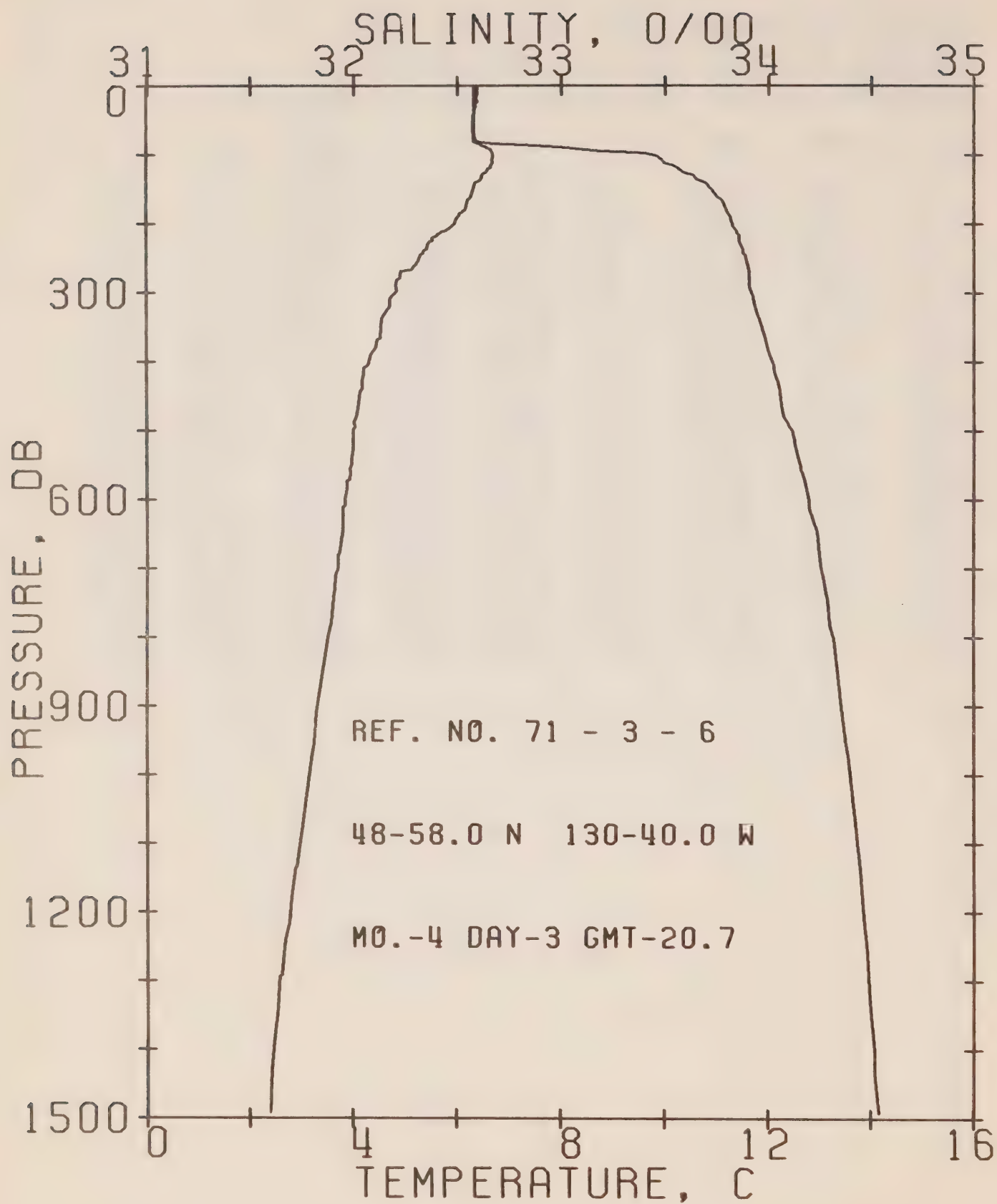
DATE 3/ 4/71

POSITION 48-51.0N, 128-40.0W GMT 14.2

RESULTS OF STP CAST 141 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.70	32.55	0	25.56	243.9	0.0	0.0	1475.
10	6.70	32.55	10	25.56	244.2	0.24	0.01	1475.
20	6.69	32.55	20	25.56	244.2	0.49	0.05	1475.
30	6.59	32.54	30	25.56	243.8	0.73	0.11	1475.
50	6.58	32.55	50	25.57	243.3	1.22	0.31	1475.
75	6.59	32.56	75	25.58	242.9	1.83	0.70	1475.
100	7.30	33.41	99	26.15	189.1	2.38	1.19	1480.
125	7.09	33.63	124	26.35	170.0	2.82	1.69	1480.
150	6.98	33.81	149	26.51	155.7	3.22	2.26	1480.
175	6.73	33.87	174	26.59	148.0	3.60	2.88	1479.
200	6.43	33.88	199	26.64	144.0	3.97	3.58	1479.
225	6.26	33.91	223	26.68	140.1	4.32	4.35	1478.
250	6.00	33.92	248	26.72	136.4	4.67	5.19	1478.
300	5.57	33.96	298	26.81	128.6	5.33	7.05	1477.
400	4.97	34.03	397	26.93	117.6	6.56	11.41	1476.
500	4.56	34.11	496	27.04	107.7	7.68	16.56	1476.
600	4.35	34.20	595	27.14	99.8	8.72	22.35	1477.
800	3.87	34.34	793	27.30	85.4	10.56	35.45	1478.
1000	3.36	34.41	990	27.41	76.0	12.18	50.26	1480.
1200	2.96	34.47	1188	27.49	68.0	13.62	66.37	1481.
1500	2.42	34.54	1484	27.59	58.6	15.50	92.25	1484.





PACIFIC OCEANOGRAPHIC GROUP

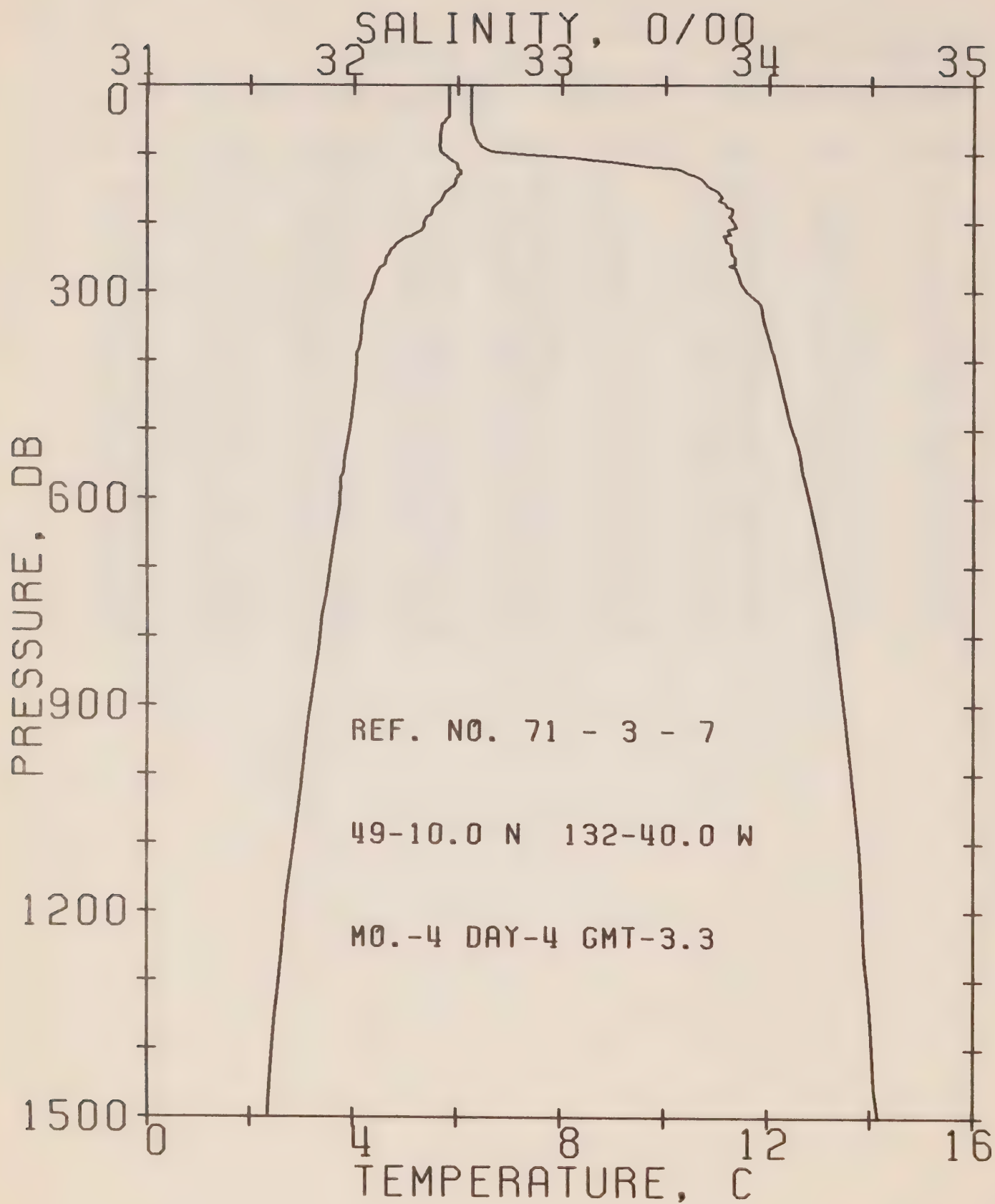
REFERENCE NO. 71- 3- 6

DATE 3/ 4/71

POSITION 48-58.0N, 130-40.0W GMT 20.7

RESULTS OF STP CAST 124 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.40	32.58	0	25.62	237.9	0.0	0.0	1473.
10	6.40	32.58	10	25.62	238.3	0.24	0.01	1474.
20	6.38	32.58	20	25.62	238.2	0.48	0.05	1474.
30	6.37	32.58	30	25.62	238.1	0.71	0.11	1474.
50	6.30	32.58	50	25.63	237.5	1.19	0.30	1474.
75	6.30	32.59	75	25.64	237.2	1.78	0.68	1474.
100	6.70	33.44	99	26.25	179.0	2.32	1.16	1477.
125	6.59	33.59	124	26.39	166.7	2.75	1.65	1478.
150	6.33	33.73	149	26.53	153.3	3.15	2.21	1477.
175	6.19	33.79	174	26.60	147.1	3.52	2.83	1477.
200	5.97	33.83	199	26.66	142.0	3.89	3.52	1477.
225	5.54	33.86	223	26.73	134.8	4.23	4.26	1475.
250	5.29	33.90	248	26.79	129.6	4.56	5.06	1475.
300	4.83	33.92	298	26.87	122.7	5.19	6.82	1474.
400	4.32	34.02	397	27.00	110.5	6.35	10.96	1473.
500	4.02	34.12	496	27.11	100.9	7.41	15.82	1474.
600	3.86	34.20	595	27.19	94.1	8.39	21.30	1475.
800	3.52	34.32	793	27.32	82.9	10.16	33.89	1477.
1000	3.16	34.40	990	27.42	74.3	11.74	48.31	1479.
1200	2.79	34.47	1188	27.50	66.8	13.14	64.03	1481.



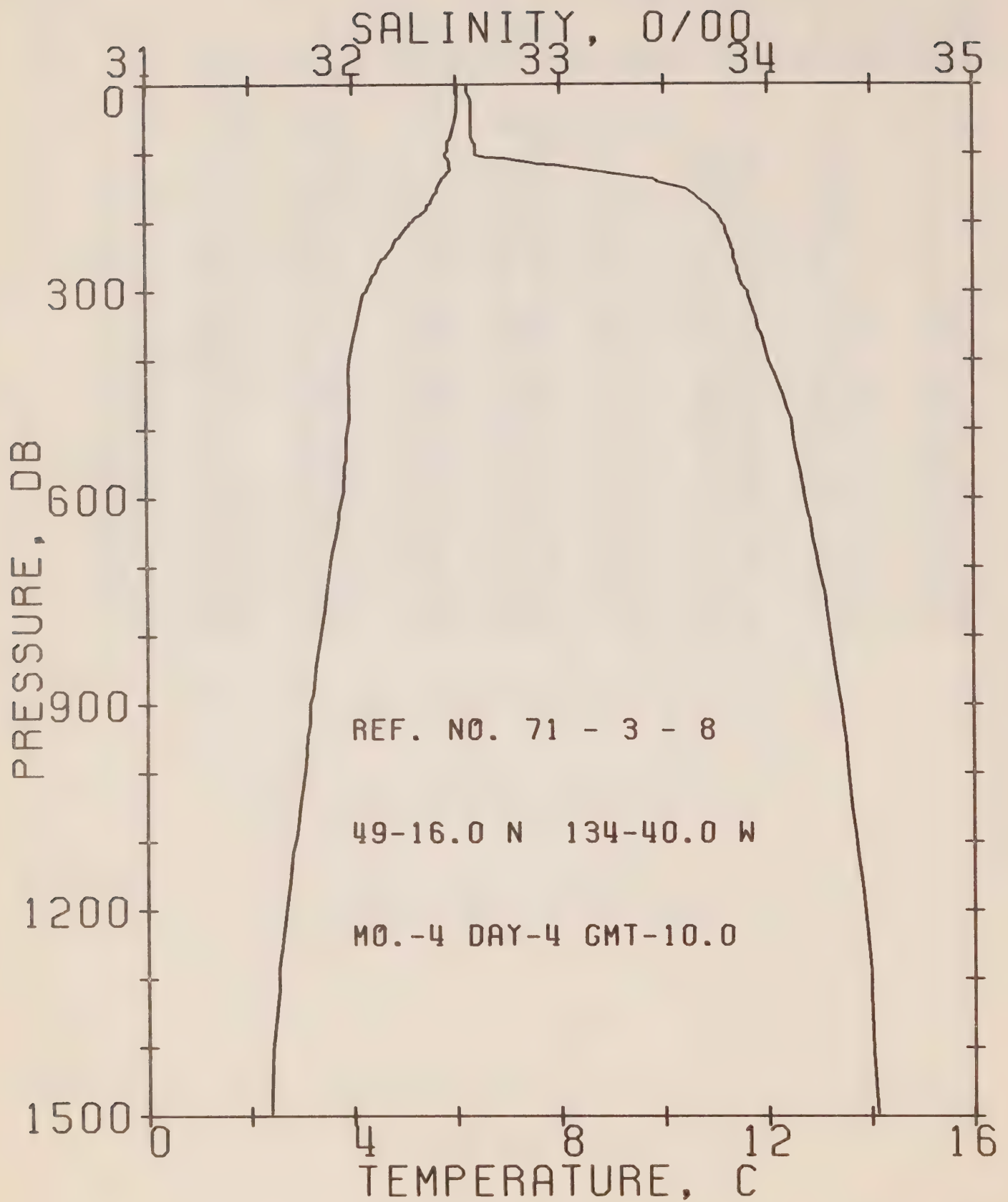
PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 7 DATE 4/ 4/71

PCSITION 49-10.0N, 132-40.0W GMT 3.3

RESULTS OF STP CAST 79 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.85	32.57	0	25.68	232.2	0.0	0.0	1471.
10	5.85	32.57	10	25.68	232.5	0.23	0.01	1471.
20	5.85	32.57	20	25.68	232.6	0.46	0.05	1472.
30	5.85	32.57	30	25.68	232.7	0.70	0.11	1472.
50	5.79	32.57	50	25.68	232.3	1.16	0.30	1472.
75	5.66	32.59	75	25.72	229.3	1.74	0.66	1472.
100	5.73	32.81	99	25.88	214.2	2.30	1.17	1473.
125	6.08	33.59	124	26.46	160.1	2.76	1.69	1476.
150	5.87	33.73	149	26.59	147.3	3.14	2.22	1475.
175	5.59	33.80	174	26.68	139.3	3.50	2.82	1475.
200	5.38	33.84	199	26.74	134.2	3.84	3.47	1474.
225	4.94	33.80	223	26.75	132.7	4.18	4.20	1473.
250	4.64	33.84	248	26.82	126.4	4.50	4.98	1472.
300	4.36	33.90	298	26.90	119.3	5.12	6.71	1472.
400	4.08	34.04	397	27.04	106.8	6.23	10.67	1472.
500	3.96	34.12	496	27.12	100.1	7.27	15.41	1474.
600	3.77	34.20	595	27.20	92.9	8.23	20.79	1475.
800	3.37	34.33	793	27.34	80.4	9.96	33.06	1476.
1000	3.03	34.41	990	27.44	72.4	11.48	47.01	1478.
1200	2.70	34.46	1188	27.51	65.9	12.86	62.40	1480.
1500	2.32	34.54	1484	27.60	57.5	14.72	87.94	1484.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71-3-8

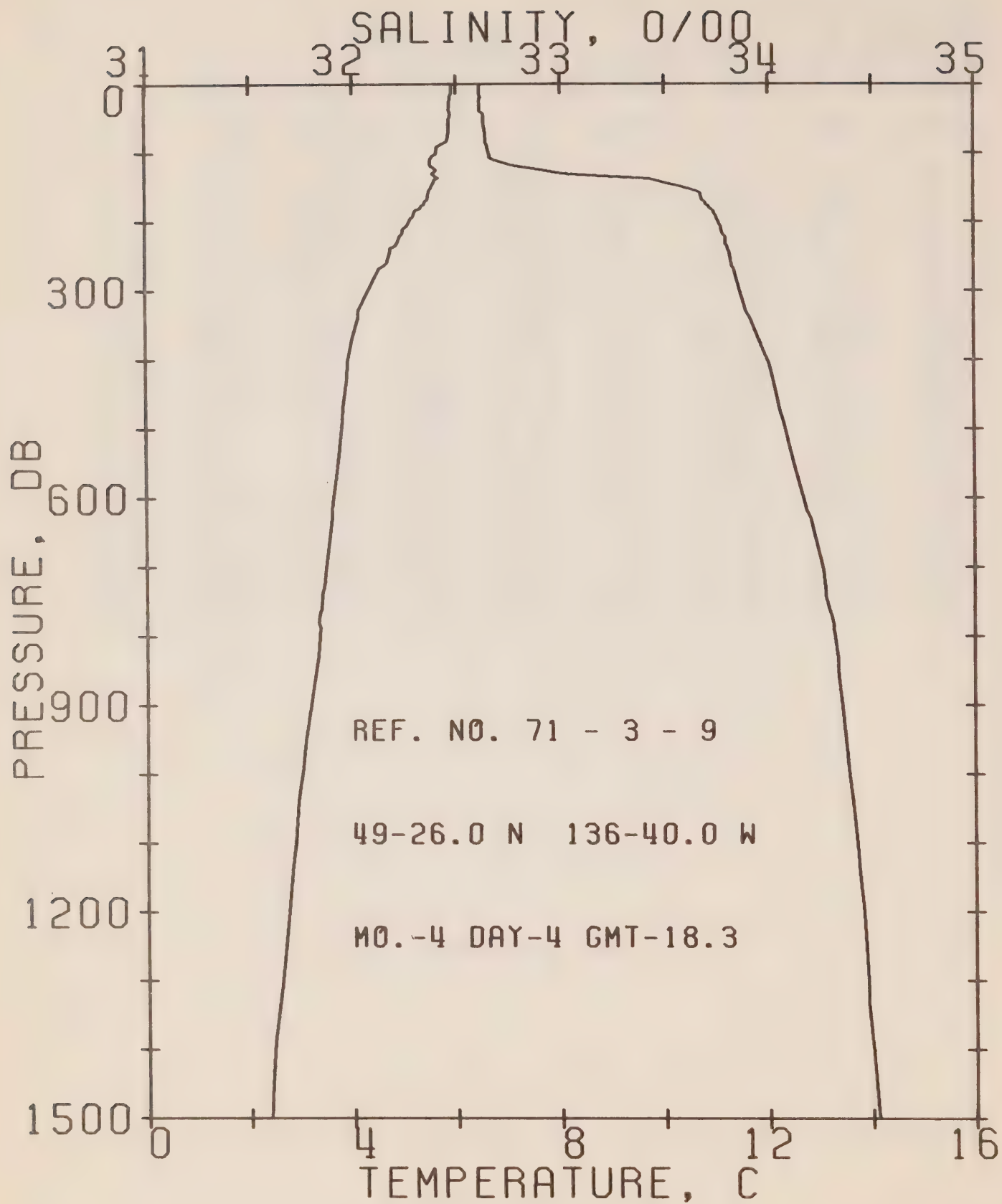
DATE 4/4/71

POSITION 49-16.0N, 134-40.0W GMT 10.0

RESULTS OF STP CAST 93 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.05	32.56	0	25.65	235.3	0.0	0.0	1472.
10	6.05	32.56	10	25.65	235.6	0.24	0.01	1472.
20	6.05	32.58	20	25.66	234.3	0.47	0.05	1472.
30	6.05	32.58	30	25.66	234.4	0.70	0.11	1473.
50	6.03	32.58	50	25.66	234.3	1.17	0.30	1473.
75	5.95	32.58	75	25.67	233.7	1.76	0.67	1473.
100	5.82	32.60	99	25.70	231.0	2.34	1.19	1473.
125	5.92	33.16	124	26.13	190.5	2.87	1.80	1474.
150	5.68	33.59	149	26.50	155.7	3.30	2.39	1474.
175	5.48	33.72	174	26.63	144.0	3.67	3.01	1474.
200	5.17	33.79	199	26.72	135.8	4.02	3.68	1473.
225	4.87	33.82	223	26.78	130.1	4.35	4.40	1473.
250	4.68	33.84	248	26.82	126.8	4.67	5.17	1472.
300	4.30	33.91	298	26.91	117.9	5.29	6.89	1472.
400	3.96	34.01	397	27.03	107.7	6.41	10.89	1472.
500	3.92	34.12	496	27.12	99.5	7.44	15.61	1474.
600	3.81	34.19	595	27.18	94.6	8.41	21.05	1475.
800	3.39	34.31	793	27.32	82.4	10.17	33.57	1476.
1000	3.07	34.39	990	27.42	73.9	11.72	47.78	1478.
1200	2.70	34.47	1188	27.52	65.2	13.12	63.34	1480.





PACIFIC OCEANOGRAPHIC GROUP

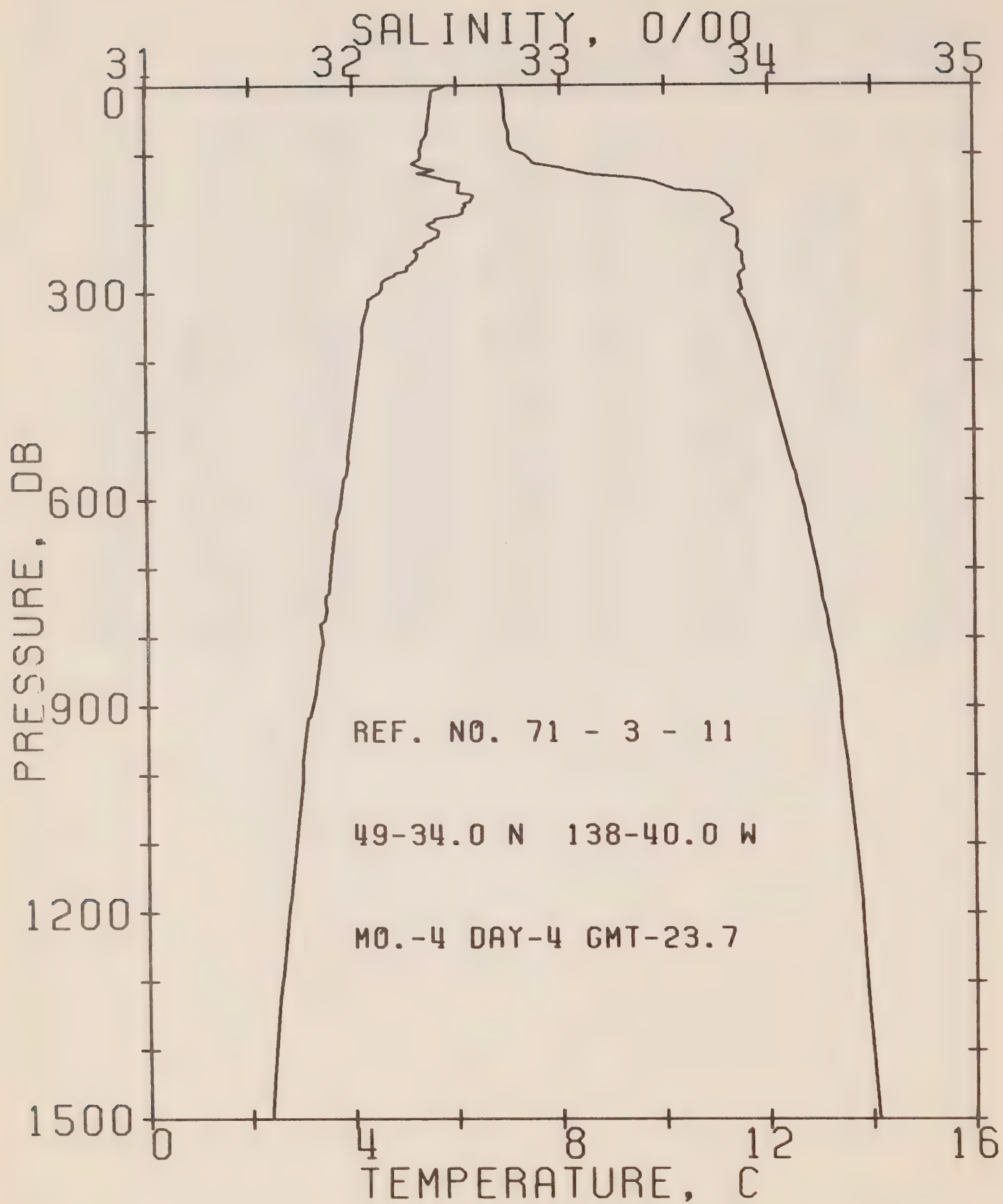
REFERENCE NO. 71- 3- 9

DATE 4/ 4/71

POSITION 49-26.0N, 136-40.0W GMT 18.3

RESULTS OF STP CAST 80 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.95	32.62	0	25.71	229.7	0.0	0.0	1472.
10	5.95	32.62	10	25.71	230.0	0.23	0.01	1472.
20	5.92	32.62	20	25.71	229.7	0.46	0.05	1472.
30	5.91	32.62	30	25.71	229.7	0.69	0.11	1472.
50	5.90	32.64	50	25.73	228.3	1.15	0.29	1472.
75	5.88	32.65	75	25.74	227.6	1.72	0.66	1473.
100	5.65	32.67	99	25.78	223.9	2.28	1.16	1472.
125	5.65	32.92	124	25.98	205.3	2.83	1.78	1473.
150	5.56	33.60	149	26.53	153.6	3.26	2.39	1474.
175	5.42	33.71	174	26.63	144.1	3.63	3.00	1474.
200	5.13	33.77	199	26.71	136.6	3.98	3.67	1473.
225	4.93	33.80	223	26.76	132.3	4.32	4.39	1473.
250	4.73	33.82	248	26.80	128.5	4.64	5.18	1472.
300	4.33	33.87	298	26.88	121.1	5.27	6.93	1472.
400	3.93	34.00	397	27.03	107.9	6.41	11.00	1472.
500	3.80	34.09	496	27.11	100.9	7.45	15.78	1473.
600	3.64	34.17	595	27.19	93.6	8.43	21.23	1474.
800	3.37	34.33	793	27.34	80.8	10.16	33.51	1476.
1000	3.01	34.39	990	27.42	73.3	11.70	47.62	1478.
1200	2.74	34.46	1188	27.50	66.5	13.09	63.24	1480.
1500	2.36	34.53	1484	27.59	58.8	14.98	89.09	1484.



PACIFIC OCEANOGRAPHIC GROUP

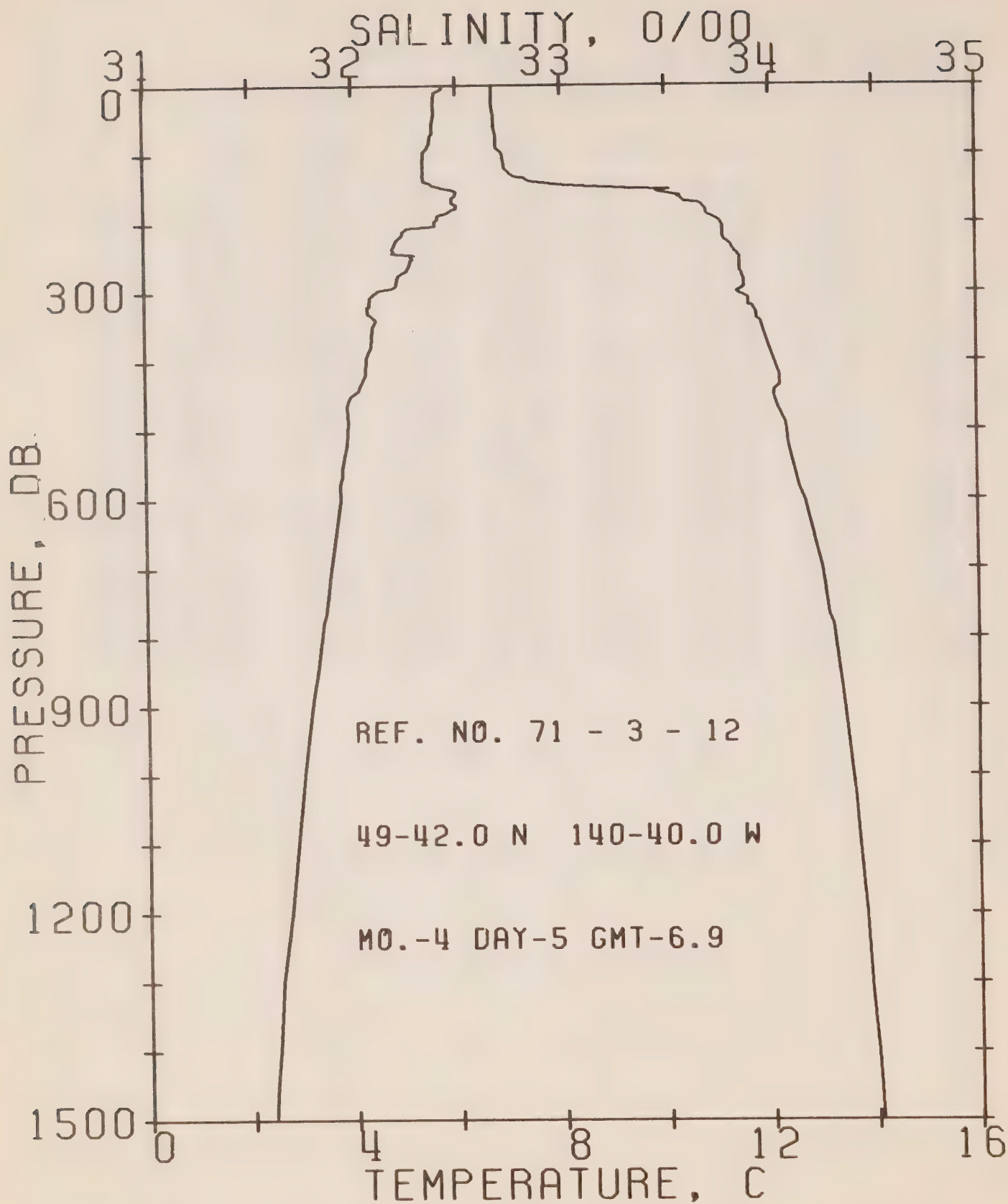
REFERENCE NO. 71- 3- 11

DATE 4/ 4/71

POSITION 49-34.0N, 139-40.0W GMT 23.7

RESULTS OF STP CAST 96 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.76	32.72	0	25.81	220.0	0.0	0.0	1471.
10	5.57	32.73	10	25.84	217.3	0.22	0.01	1471.
20	5.55	32.74	20	25.84	216.8	0.44	0.04	1471.
30	5.53	32.74	30	25.85	216.3	0.65	0.10	1471.
50	5.50	32.74	50	25.86	215.9	1.08	0.28	1471.
75	5.44	32.76	75	25.88	214.3	1.62	0.62	1471.
100	5.33	32.84	99	25.95	207.3	2.15	1.09	1471.
125	5.45	33.09	124	26.14	190.3	2.66	1.67	1472.
150	6.06	33.55	149	26.43	163.3	3.09	2.27	1476.
175	6.21	33.82	174	26.62	145.4	3.47	2.90	1477.
200	5.48	33.80	199	26.69	138.4	3.82	3.58	1475.
225	5.52	33.86	223	26.74	134.6	4.16	4.32	1475.
250	5.27	33.88	248	26.78	130.5	4.49	5.11	1475.
300	4.53	33.86	298	26.85	124.1	5.13	6.88	1472.
400	4.15	33.99	397	26.99	111.4	6.28	11.01	1473.
500	3.98	34.08	496	27.08	103.7	7.36	15.92	1474.
600	3.78	34.17	595	27.17	95.5	8.36	21.50	1475.
800	3.39	34.30	793	27.32	82.8	10.13	34.13	1476.
1000	3.02	34.39	990	27.42	73.9	11.69	48.41	1478.
1200	2.73	34.45	1188	27.50	67.0	13.10	64.14	1480.
1500	2.35	34.53	1484	27.59	58.6	14.99	90.03	1484.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 12

DATE 5/ 4/71

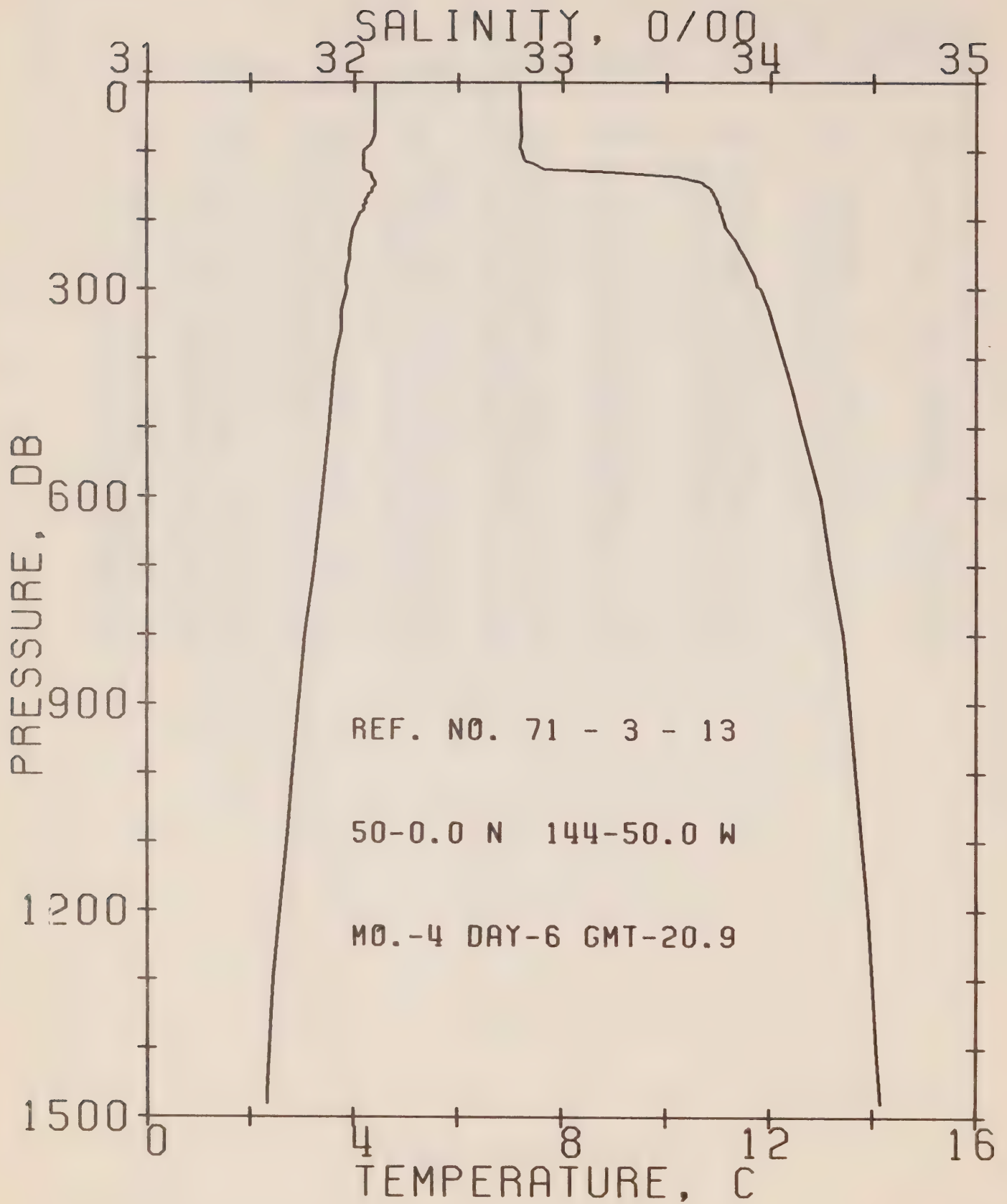
POSITION 49-42.0N, 140-40.0W

GMT 6.9

RESULTS OF STP CAST 114 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.77	32.68	0	25.77	223.1	0.0	0.0	1471.
10	5.62	32.68	10	25.79	221.7	0.22	0.01	1471.
20	5.61	32.68	20	25.79	221.7	0.44	0.05	1471.
30	5.60	32.68	30	25.80	221.5	0.67	0.10	1471.
50	5.60	32.69	50	25.80	221.2	1.11	0.28	1471.
75	5.53	32.70	75	25.82	219.9	1.66	0.63	1471.
100	5.39	32.73	99	25.86	216.1	2.21	1.12	1471.
125	5.37	32.76	124	25.88	214.1	2.75	1.74	1472.
150	5.85	33.34	149	26.29	176.5	3.25	2.45	1475.
175	6.03	33.69	174	26.54	153.1	3.66	3.12	1476.
200	5.61	33.77	199	26.66	141.8	4.03	3.82	1475.
225	4.86	33.79	223	26.76	131.8	4.37	4.55	1472.
250	5.16	33.86	248	26.78	130.7	4.69	5.34	1474.
300	4.48	33.84	298	26.84	125.0	5.33	7.13	1472.
400	4.28	34.03	397	27.01	109.9	6.48	11.24	1473.
500	3.91	34.08	496	27.09	102.5	7.55	16.11	1473.
600	3.76	34.17	595	27.17	95.4	8.54	21.68	1475.
800	3.38	34.31	793	27.32	82.2	10.31	34.26	1476.
1000	3.01	34.39	990	27.42	73.5	11.87	48.49	1478.
1200	2.74	34.45	1188	27.49	67.3	13.28	64.25	1480.
1500	2.37	34.52	1484	27.58	59.6	15.17	90.26	1484.





PACIFIC OCEANOGRAPHIC GROUP

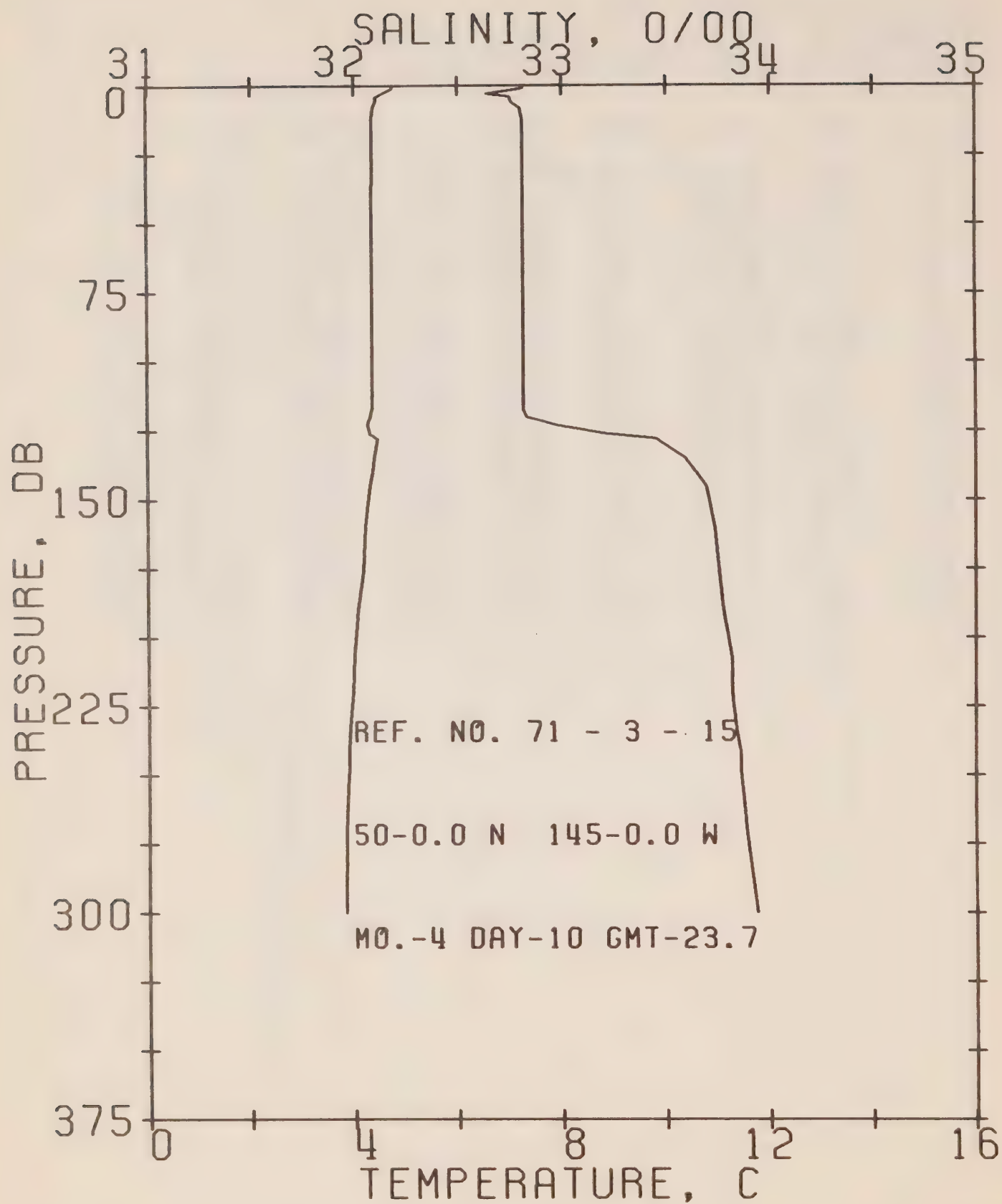
REFERENCE NO. 71- 3- 13

DATE 6/ 4/71

POSITION 50- 0.0N, 144-50.0W GMT 20.9

RESULTS OF STP CAST 50 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.43	32.80	0	26.02	199.8	0.0	0.0	1466.
10	4.43	32.80	10	26.02	200.0	0.20	0.01	1466.
20	4.43	32.80	20	26.02	200.0	0.40	0.04	1466.
30	4.43	32.80	30	26.02	199.9	0.60	0.09	1466.
50	4.43	32.81	50	26.02	199.8	1.00	0.25	1467.
75	4.43	32.81	74	26.03	199.8	1.50	0.57	1467.
100	4.19	32.81	99	26.05	197.4	2.00	1.02	1466.
125	4.18	32.91	124	26.14	189.9	2.48	1.58	1467.
150	4.42	33.70	149	26.73	133.8	2.86	2.10	1469.
175	4.25	33.75	174	26.79	128.2	3.19	2.64	1469.
200	4.08	33.78	199	26.83	124.4	3.50	3.24	1469.
225	3.97	33.83	223	26.88	120.0	3.81	3.90	1469.
250	3.93	33.88	248	26.92	116.1	4.10	4.62	1469.
300	3.88	33.96	298	27.00	109.8	4.67	6.20	1470.
400	3.66	34.07	397	27.11	100.0	5.71	9.92	1471.
500	3.53	34.16	496	27.19	92.8	6.68	14.32	1472.
600	3.40	34.25	595	27.27	85.3	7.57	19.30	1473.
800	3.07	34.36	793	27.39	75.1	9.18	30.73	1475.
1000	2.83	34.42	990	27.46	69.3	10.62	43.96	1477.
1200	2.59	34.48	1188	27.53	63.4	11.95	58.83	1480.



PACIFIC OCEANOGRAPHIC GROUP

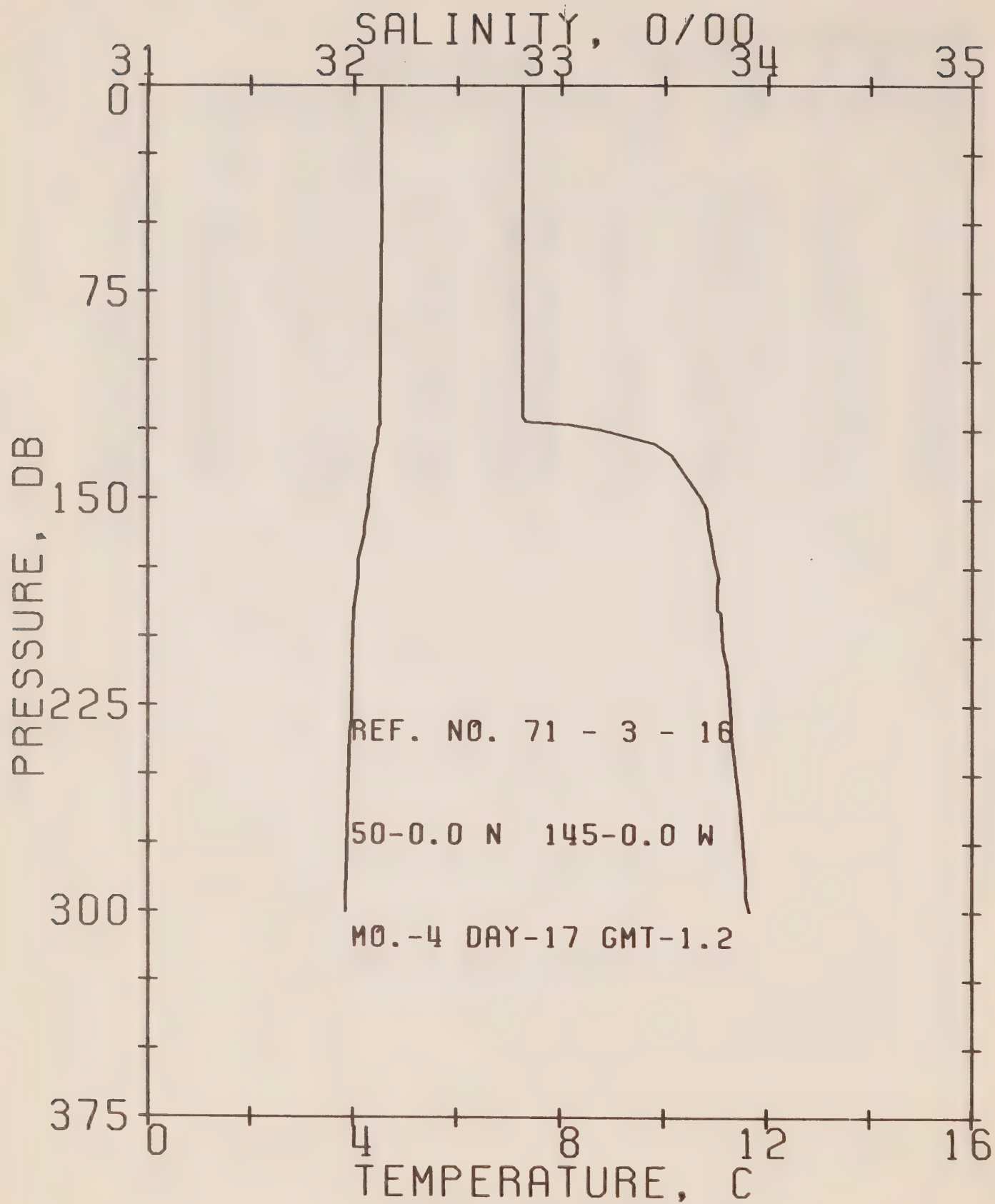
REFERENCE NO. 71- 3- 15

DATE 10/ 4/71

POSITION 50- 0.0N. 145- 0.0W GMT 23.7

RESULTS OF STP CAST 29 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.77	32.82	0	26.00	201.7	0.0	0.0	1467.
10	4.39	32.81	10	26.04	198.5	0.20	0.01	1466.
20	4.38	32.82	20	26.04	198.1	0.40	0.04	1466.
30	4.37	32.82	30	26.04	198.1	0.60	0.09	1466.
50	4.36	32.82	50	26.04	198.2	1.00	0.25	1466.
75	4.36	32.82	74	26.04	198.4	1.49	0.57	1467.
100	4.36	32.82	99	26.04	198.6	1.99	1.01	1467.
125	4.28	33.13	124	26.29	174.9	2.48	1.57	1468.
150	4.29	33.71	149	26.76	131.1	2.83	2.07	1469.
175	4.18	33.76	174	26.81	126.9	3.15	2.60	1469.
200	4.03	33.80	199	26.86	122.2	3.47	3.20	1469.
225	3.95	33.83	223	26.88	119.7	3.77	3.85	1469.
250	3.87	33.86	248	26.92	116.6	4.06	4.56	1469.
300	3.80	33.94	298	26.99	110.4	4.63	6.15	1469.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 16

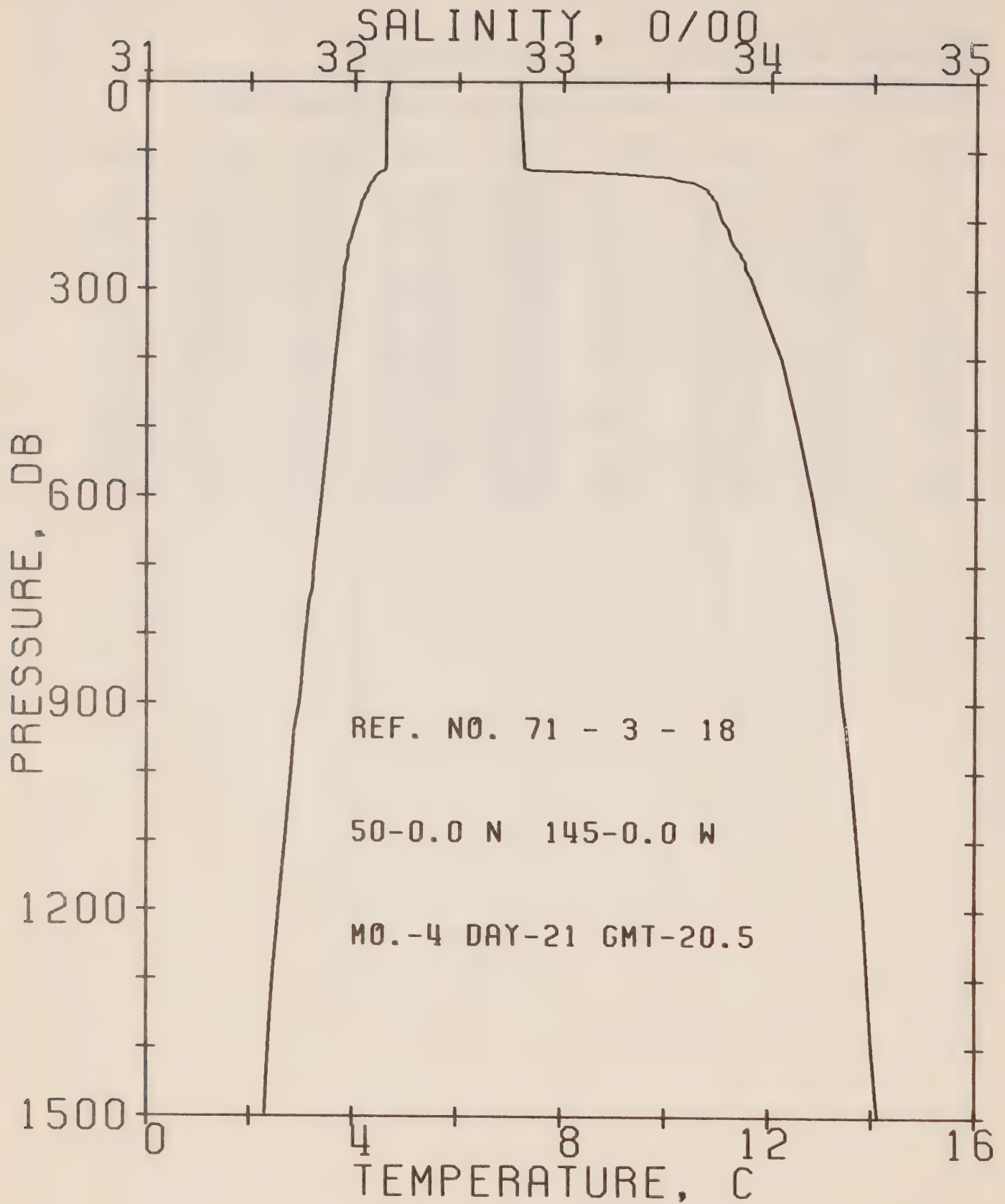
DATE 17/ 4/71

PCPOSITION 50- 0.0N, 145- 0.0W GMT 1.2

RESULTS OF STP CAST 28 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.55	32.82	0	26.02	199.5	0.0	0.0	1466.
10	4.55	32.82	10	26.02	199.8	0.20	0.01	1466.
20	4.55	32.82	20	26.02	199.9	0.40	0.04	1467.
30	4.55	32.82	30	26.02	199.9	0.60	0.09	1467.
50	4.56	32.82	50	26.02	200.2	1.00	0.25	1467.
75	4.54	32.82	74	26.02	200.1	1.50	0.57	1467.
100	4.53	32.82	99	26.03	200.2	2.00	1.02	1468.
125	4.49	33.20	124	26.33	171.5	2.50	1.59	1469.
150	4.31	33.69	149	26.74	133.3	2.86	2.09	1469.
175	4.11	33.76	174	26.81	126.1	3.18	2.63	1469.
200	4.00	33.79	199	26.85	123.1	3.49	3.23	1468.
225	3.97	33.82	223	26.88	120.2	3.80	3.88	1469.
250	3.92	33.85	248	26.91	117.7	4.10	4.60	1469.
300	3.83	33.92	298	26.97	112.2	4.67	6.21	1470.





PACIFIC OCEANOGRAPHIC GROUP

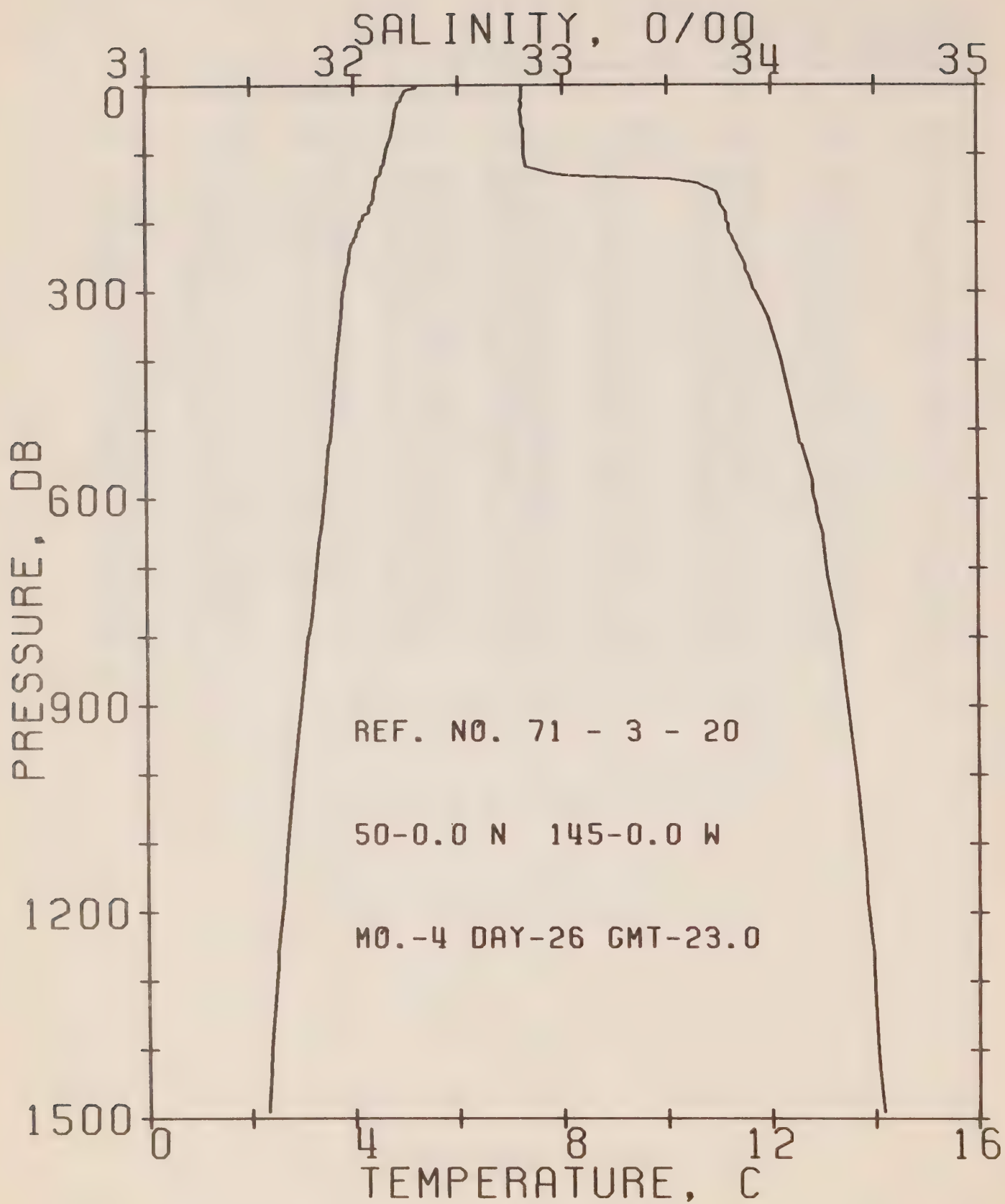
REFERENCE NO. 71- 3- 18

DATE 21/ 4/71

POSITION 50- 0.0N, 145- 0.0W GMT 20.5

RESULTS OF STP CAST 54 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	4.71	32.80	0	25.99	202.6	0.0	0.0	1467.
10	4.67	32.80	10	25.99	202.5	0.20	0.01	1467.
20	4.65	32.80	20	26.00	202.4	0.40	0.04	1467.
30	4.62	32.80	30	26.00	202.1	0.61	0.09	1467.
50	4.62	32.80	50	26.00	201.9	1.01	0.26	1467.
75	4.62	32.81	74	26.01	201.8	1.52	0.58	1468.
100	4.62	32.81	99	26.01	201.6	2.02	1.03	1468.
125	4.62	32.82	124	26.02	201.4	2.52	1.61	1469.
150	4.31	33.66	149	26.72	135.0	2.92	2.16	1469.
175	4.15	33.74	174	26.80	127.7	3.25	2.70	1469.
200	4.05	33.77	199	26.83	124.9	3.56	3.30	1469.
225	3.96	33.81	223	26.87	121.2	3.87	3.96	1469.
250	3.89	33.86	248	26.92	116.9	4.17	4.68	1469.
300	3.80	33.93	298	26.98	111.1	4.74	6.28	1469.
400	3.66	34.06	397	27.10	100.7	5.79	10.03	1471.
500	3.54	34.14	496	27.17	94.3	6.77	14.49	1472.
600	3.40	34.21	595	27.24	88.4	7.68	19.59	1473.
800	3.10	34.33	793	27.37	77.6	9.35	31.41	1475.
1000	2.82	34.40	990	27.45	70.7	10.83	45.01	1477.
1200	2.57	34.46	1188	27.52	64.7	12.18	60.16	1480.
1500	2.28	34.53	1483	27.60	57.8	14.03	85.45	1484.



PACIFIC OCEANOGRAPHIC GROUP

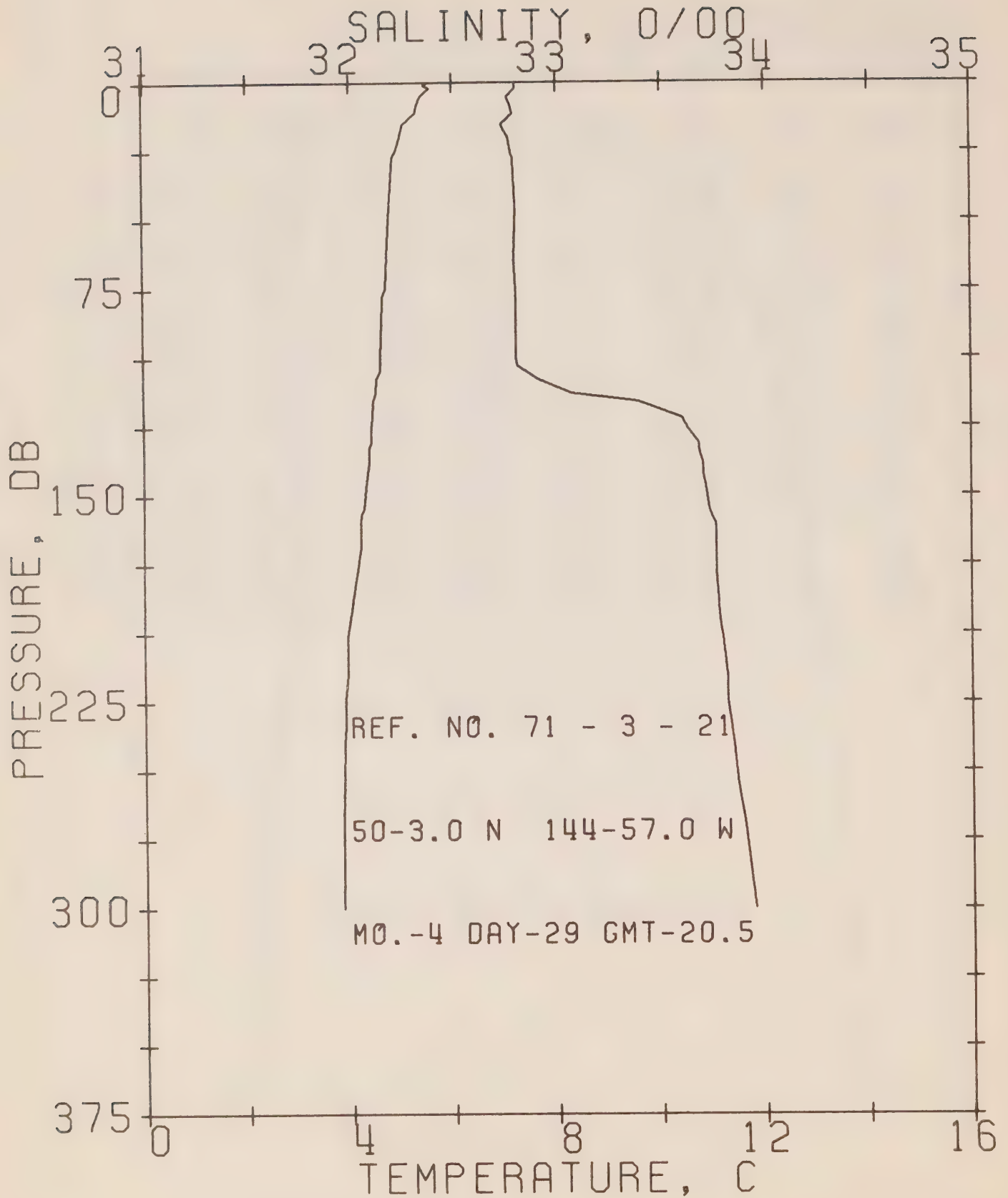
REFERENCE NO. 71- 3- 20

DATE 26/ 4/71

POSITION 50- 0.0N, 145- 0.0W GMT 23.0

RESULTS OF STP CAST 81 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.23	32.81	0	25.94	207.3	0.0	0.0	1469.
10	5.01	32.81	10	25.96	205.2	0.21	0.01	1468.
20	4.94	32.80	20	25.97	205.1	0.41	0.04	1468.
30	4.86	32.81	30	25.98	203.9	0.62	0.09	1468.
50	4.80	32.81	50	25.99	203.5	1.02	0.26	1468.
75	4.75	32.82	75	26.00	202.3	1.53	0.58	1468.
100	4.64	32.82	99	26.01	201.4	2.04	1.03	1468.
125	4.55	32.91	124	26.10	193.6	2.53	1.60	1468.
150	4.43	33.71	149	26.74	133.2	2.93	2.15	1469.
175	4.33	33.77	174	26.80	127.8	3.25	2.69	1469.
200	4.13	33.80	199	26.84	123.8	3.57	3.29	1469.
225	4.03	33.82	223	26.87	120.8	3.87	3.95	1469.
250	3.93	33.86	248	26.92	116.9	4.17	4.67	1469.
300	3.80	33.93	298	26.98	111.1	4.74	6.27	1469.
400	3.68	34.05	397	27.09	101.4	5.80	10.04	1471.
500	3.58	34.13	496	27.16	95.7	6.79	14.54	1472.
600	3.44	34.21	595	27.24	88.8	7.70	19.68	1473.
800	3.11	34.33	793	27.37	77.8	9.37	31.54	1475.
1000	2.83	34.41	990	27.45	70.1	10.85	45.06	1477.
1200	2.60	34.47	1188	27.52	64.5	12.19	60.08	1480.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 21

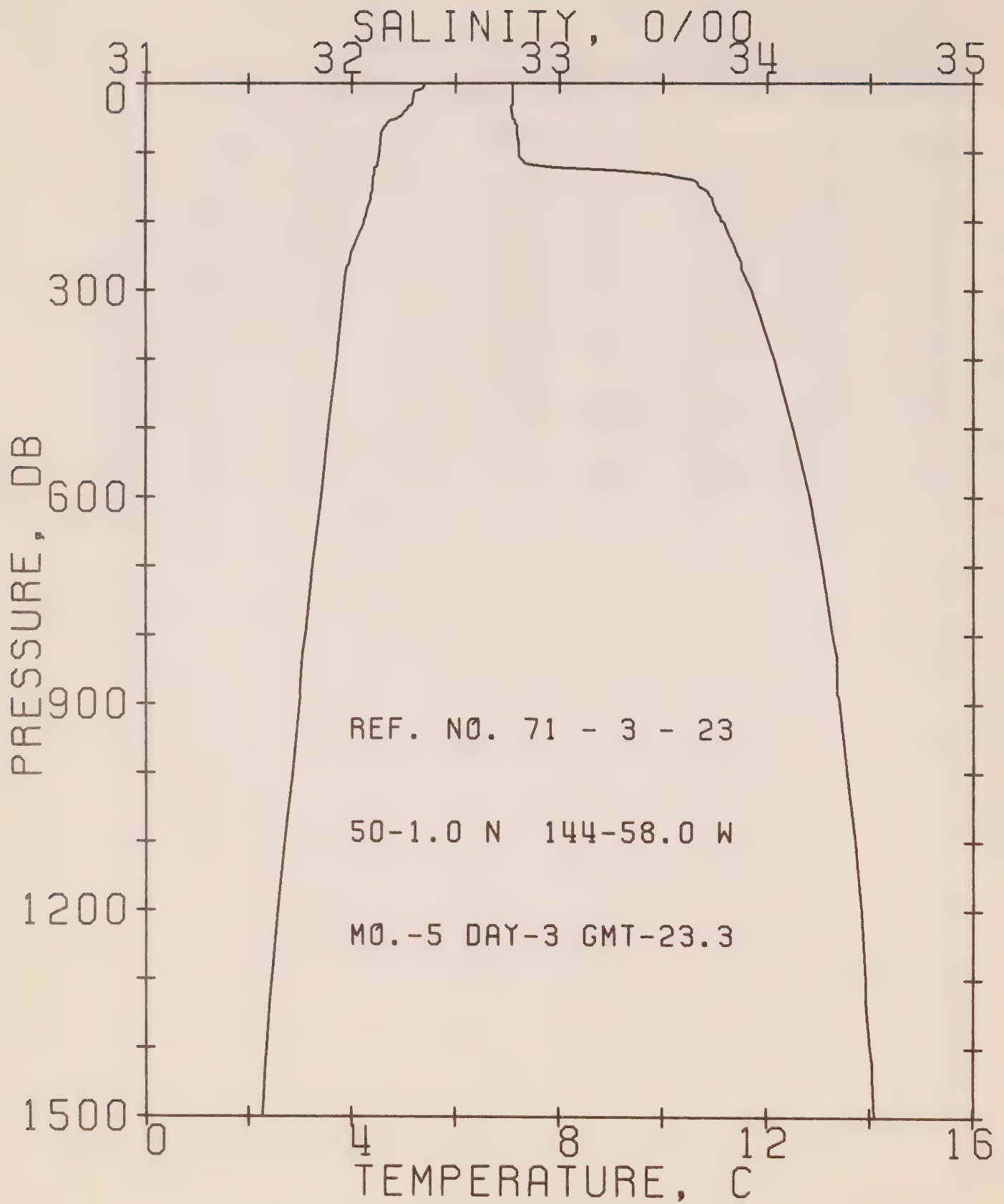
DATE 29/ 4/71

POSITION 50- 3.0N, 144-57.0W GMT 20.5

RESULTS OF STP CAST 46 POINTS TAKEN FROM ANALOG TRACE

FPRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.56	32.81	0	25.90	210.9	0.0	0.0	1470.
10	5.33	32.80	10	25.92	209.8	0.21	0.01	1470.
20	5.01	32.78	20	25.94	207.6	0.42	0.04	1468.
30	4.86	32.80	30	25.98	204.5	0.63	0.10	1468.
50	4.78	32.81	50	25.99	203.4	1.03	0.26	1468.
75	4.72	32.81	75	26.00	202.8	1.54	0.59	1468.
100	4.61	32.81	99	26.01	201.9	2.05	1.04	1468.
125	4.43	33.63	124	26.68	138.6	2.48	1.53	1469.
150	4.30	33.73	149	26.77	130.1	2.81	1.99	1469.
175	4.16	33.77	174	26.82	125.8	3.13	2.52	1469.
200	3.94	33.80	199	26.86	121.8	3.44	3.11	1468.
225	3.88	33.82	223	26.89	119.5	3.74	3.77	1468.
250	3.84	33.86	248	26.92	116.2	4.04	4.48	1469.
300	3.80	33.95	298	27.00	109.7	4.60	6.06	1469.





PACIFIC OCEANOGRAPHIC GROUP

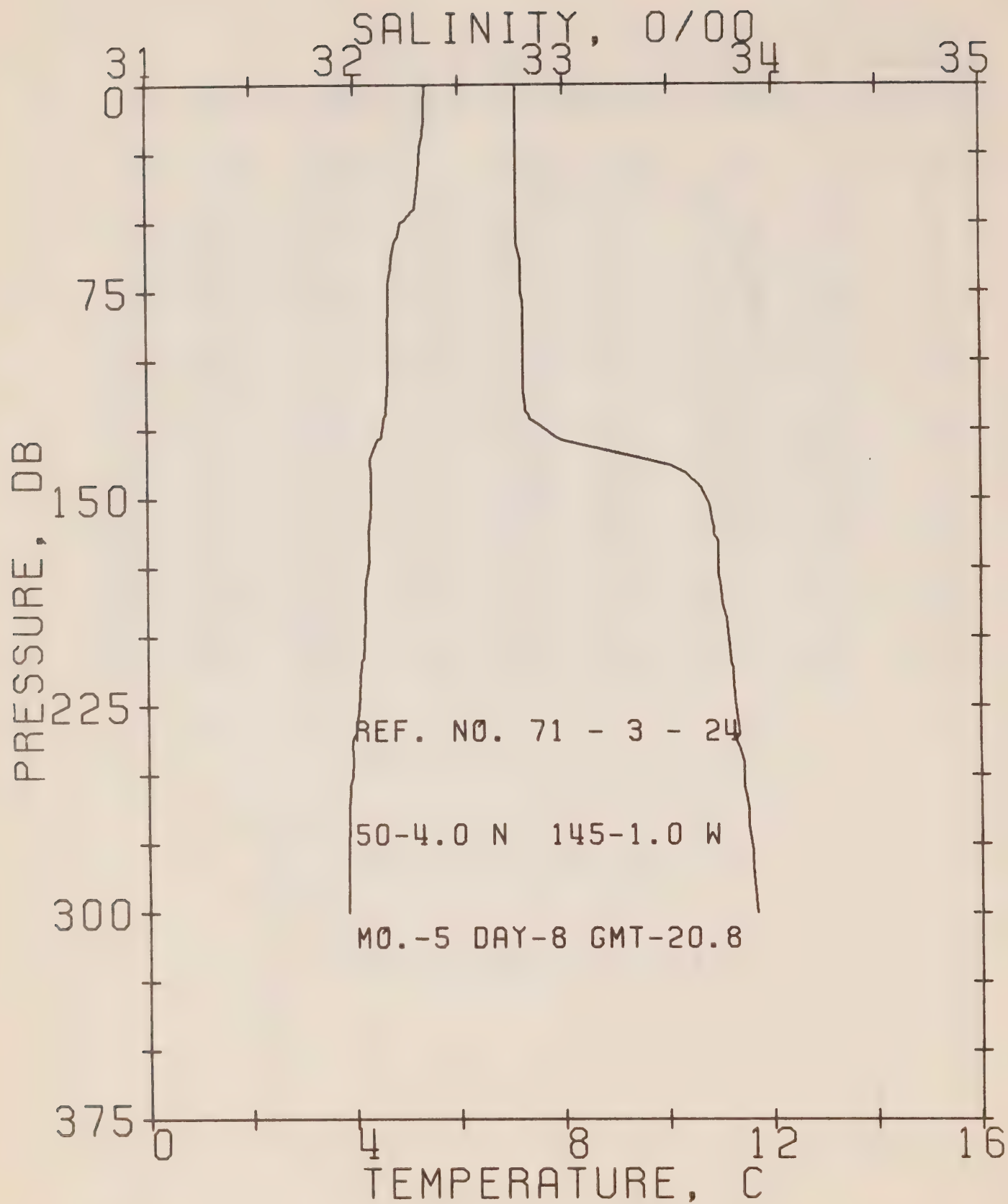
REFERENCE NO. 71- 3- 23

DATE 3/ 5/71

POSITION 50- 1.0N, 144-58.0W GMT 23.3

RESULTS OF STP CAST 60 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.46	32.78	0	25.89	212.1	0.0	0.0	1470.
10	5.28	32.78	10	25.91	210.4	0.21	0.01	1469.
20	5.21	32.78	20	25.92	209.8	0.42	0.04	1469.
30	5.19	32.78	30	25.92	209.6	0.63	0.10	1469.
50	4.91	32.78	50	25.95	206.8	1.05	0.27	1468.
75	4.59	32.80	75	26.00	202.0	1.56	0.59	1468.
100	4.55	32.81	99	26.01	201.2	2.06	1.04	1468.
125	4.45	33.19	124	26.33	171.9	2.55	1.60	1468.
150	4.41	33.68	149	26.72	134.9	2.91	2.11	1469.
175	4.36	33.75	174	26.78	129.5	3.24	2.65	1470.
200	4.25	33.79	199	26.82	125.6	3.56	3.26	1470.
225	4.12	33.83	223	26.87	121.3	3.87	3.93	1469.
250	3.99	33.87	248	26.91	117.5	4.17	4.65	1469.
300	3.86	33.93	298	26.97	111.8	4.74	6.25	1470.
400	3.72	34.04	397	27.08	102.9	5.81	10.06	1471.
500	3.56	34.13	496	27.16	95.3	6.81	14.59	1472.
600	3.43	34.21	595	27.24	88.7	7.73	19.73	1473.
800	3.12	34.32	793	27.36	78.6	9.39	31.57	1475.
1000	2.87	34.39	990	27.43	72.0	10.90	45.34	1478.
1200	2.57	34.46	1188	27.52	64.7	12.26	60.58	1480.
1500	2.26	34.52	1483	27.59	58.3	14.10	85.89	1483.



PACIFIC OCEANOGRAPHIC GROUP

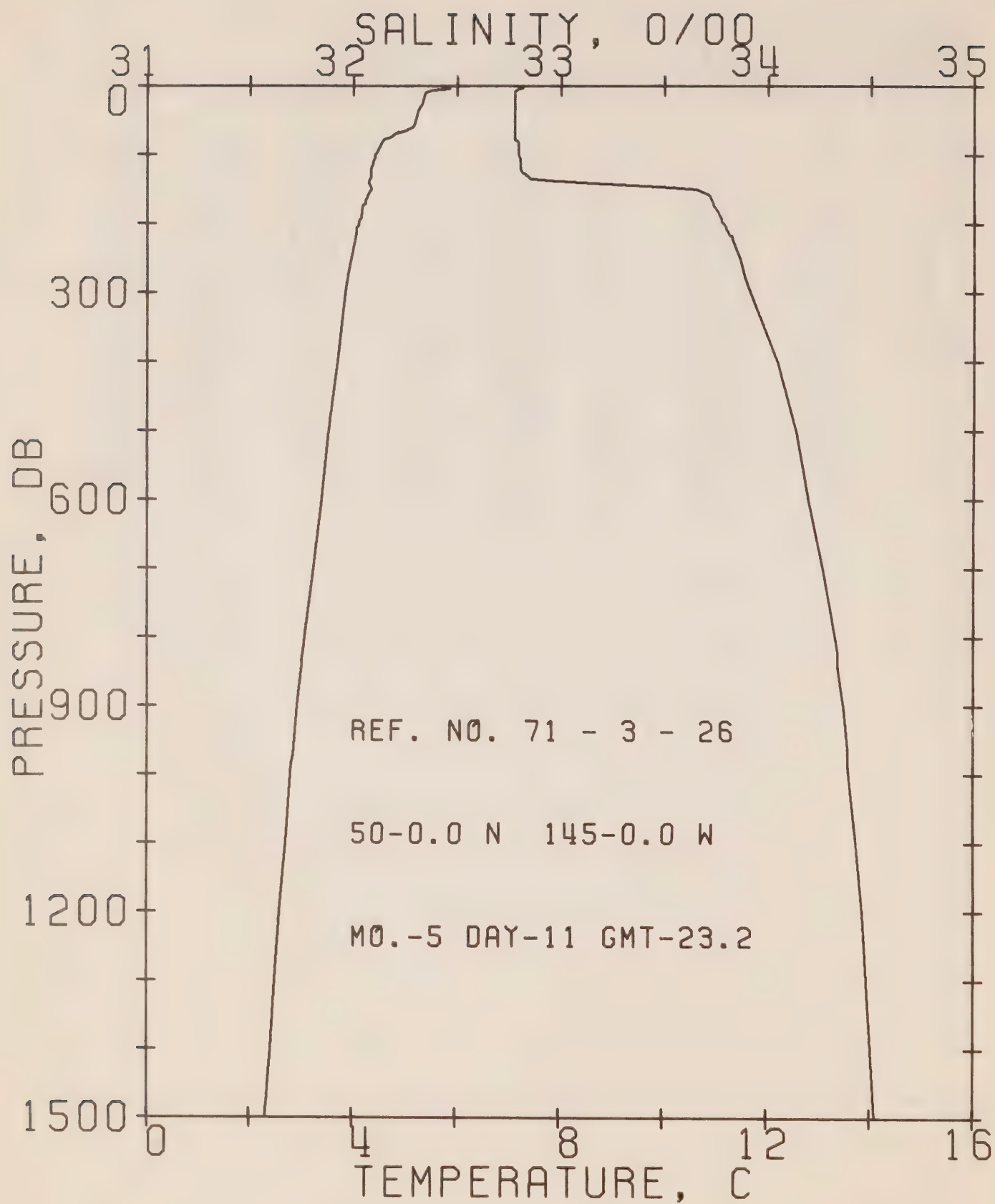
REFERENCE NO. 71- 3- 24

DATE 8/ 5/71

POSITION 50- 4.0N, 145- 1.0W GMT 20.8

RESULTS OF STP CAST 61 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.39	32.78	0	25.90	211.3	0.0	0.0	1470.
10	5.37	32.78	10	25.90	211.5	0.21	0.01	1470.
20	5.33	32.78	20	25.90	211.1	0.42	0.04	1470.
30	5.27	32.78	30	25.91	210.5	0.63	0.10	1470.
50	4.92	32.78	50	25.95	206.9	1.05	0.27	1469.
75	4.67	32.80	75	25.99	203.1	1.56	0.59	1468.
100	4.65	32.81	99	26.00	202.4	2.07	1.04	1468.
125	4.55	32.92	124	26.10	193.4	2.57	1.62	1468.
150	4.32	33.69	149	26.73	133.5	2.96	2.16	1469.
175	4.26	33.74	174	26.78	129.1	3.29	2.70	1469.
200	4.18	33.79	199	26.83	124.8	3.61	3.31	1469.
225	4.07	33.82	223	26.87	121.3	3.91	3.98	1469.
250	3.93	33.86	248	26.91	117.4	4.21	4.70	1469.
300	3.83	33.92	298	26.97	112.2	4.78	6.30	1470.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 26

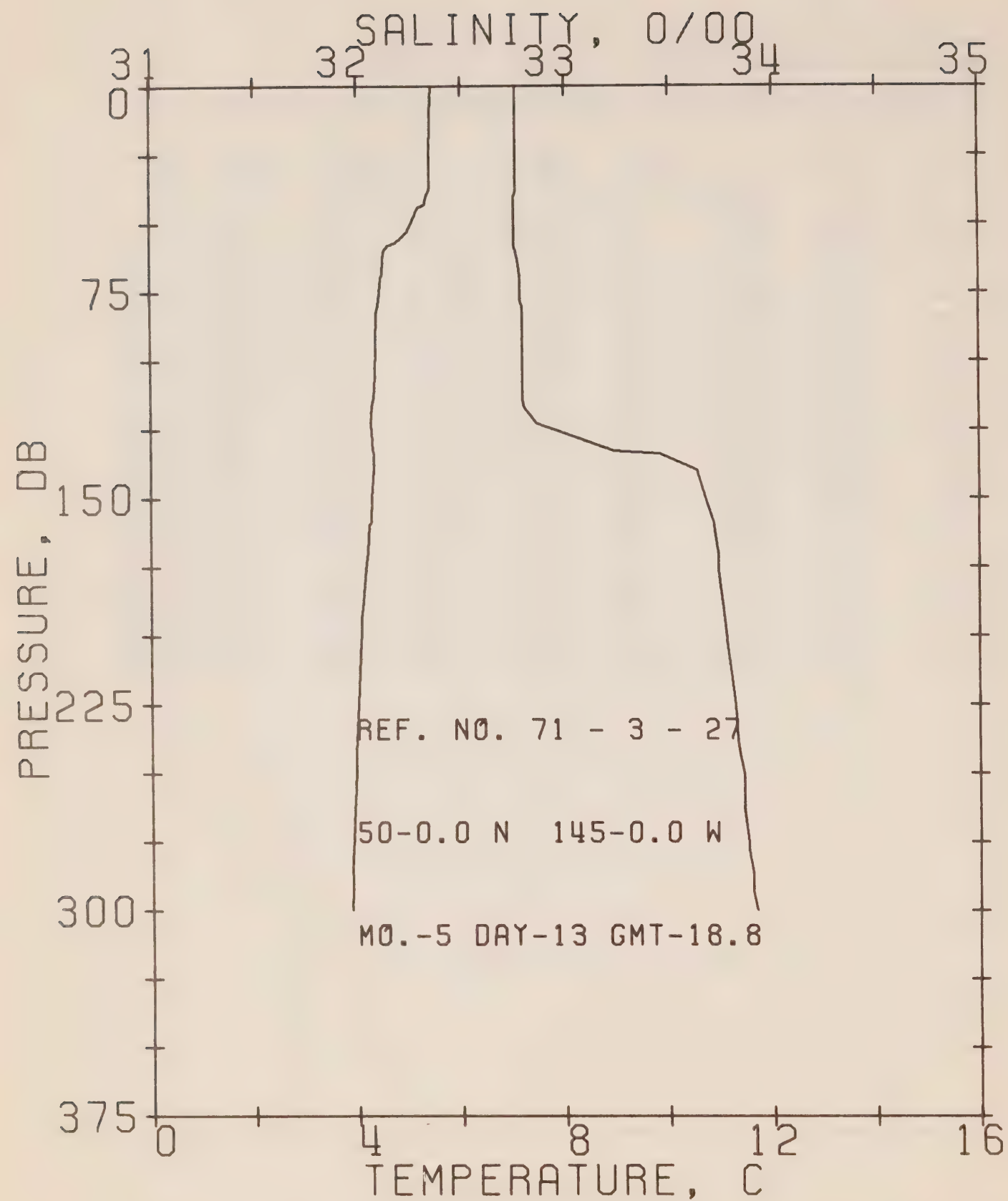
DATE 11/ 5/71

PC SITION 50- 0.0N, 145- 0.0W GMT 23.2

RESULTS OF STP CAST 67 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.71	32.82	0	25.89	211.9	0.0	0.0	1471.
10	5.42	32.78	10	25.89	211.9	0.21	0.01	1470.
20	5.38	32.78	20	25.90	211.6	0.43	0.04	1470.
30	5.32	32.78	30	25.91	211.1	0.64	0.10	1470.
50	5.23	32.78	50	25.92	210.2	1.06	0.27	1470.
75	4.71	32.78	75	25.97	205.0	1.58	0.60	1468.
100	4.44	32.80	99	26.02	200.9	2.08	1.05	1467.
125	4.36	32.82	124	26.04	198.8	2.58	1.62	1467.
150	4.37	33.66	149	26.71	136.0	3.03	2.24	1469.
175	4.21	33.75	174	26.79	128.0	3.36	2.78	1469.
200	4.12	33.79	199	26.84	124.0	3.67	3.39	1469.
225	4.05	33.84	223	26.88	120.0	3.97	4.05	1469.
250	3.99	33.87	248	26.91	117.2	4.27	4.76	1469.
300	3.87	33.92	298	26.97	112.6	4.85	6.37	1470.
400	3.72	34.05	397	27.08	102.2	5.92	10.18	1471.
500	3.55	34.14	496	27.17	94.4	6.90	14.67	1472.
600	3.42	34.20	595	27.23	89.3	7.82	19.80	1473.
800	3.08	34.33	793	27.37	77.4	9.49	31.62	1475.
1000	2.81	34.40	990	27.44	70.9	10.96	45.15	1477.
1200	2.59	34.46	1188	27.52	64.9	12.32	60.36	1480.
1500	2.30	34.52	1483	27.59	58.8	14.18	85.85	1484.





PACIFIC OCEANOGRAPHIC GROUP

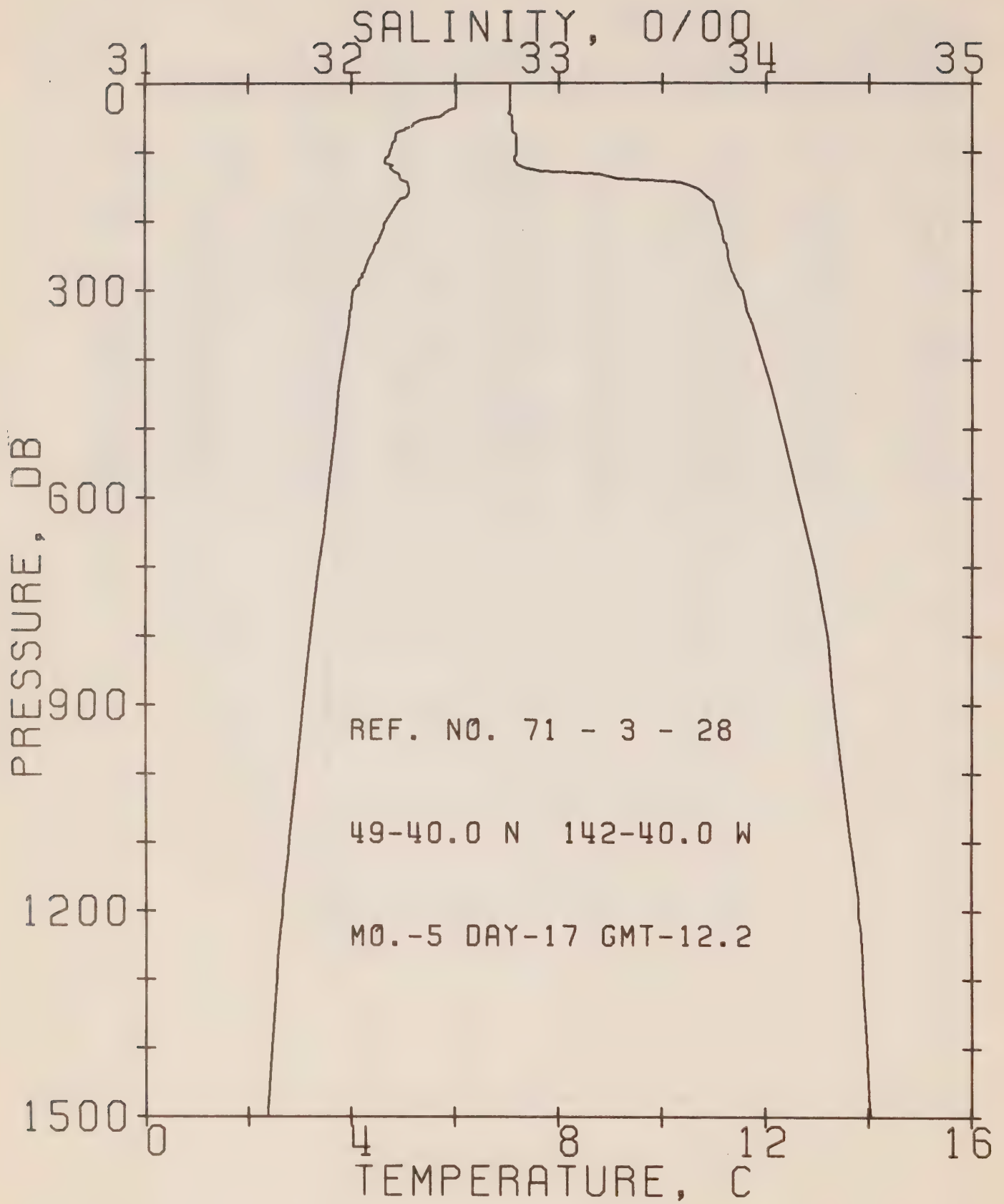
REFERENCE NO. 71- 3- 27

DATE 13/ 5/71

POSITION 50- 0.0N, 145- 0.0W GMT 18.8

RESULTS OF STP CAST 51 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.47	32.77	0	25.88	212.9	0.0	0.0	1470.
10	5.44	32.77	10	25.88	212.9	0.21	0.01	1470.
20	5.43	32.77	20	25.89	213.0	0.43	0.04	1470.
30	5.43	32.77	30	25.89	213.1	0.64	0.10	1470.
50	5.08	32.76	50	25.92	210.1	1.06	0.27	1469.
75	4.45	32.79	75	26.01	201.6	1.57	0.60	1467.
100	4.37	32.80	99	26.03	200.1	2.08	1.04	1467.
125	4.28	32.94	124	26.15	188.6	2.57	1.61	1467.
150	4.30	33.68	149	26.73	133.8	2.95	2.14	1469.
175	4.18	33.74	174	26.79	128.2	3.28	2.68	1469.
200	4.08	33.78	199	26.83	124.5	3.59	3.28	1469.
225	4.01	33.82	223	26.87	120.9	3.90	3.95	1469.
250	3.96	33.86	248	26.91	117.6	4.20	4.67	1469.
300	3.85	33.92	298	26.97	112.4	4.78	6.29	1470.



PACIFIC OCEANOGRAPHIC GROUP

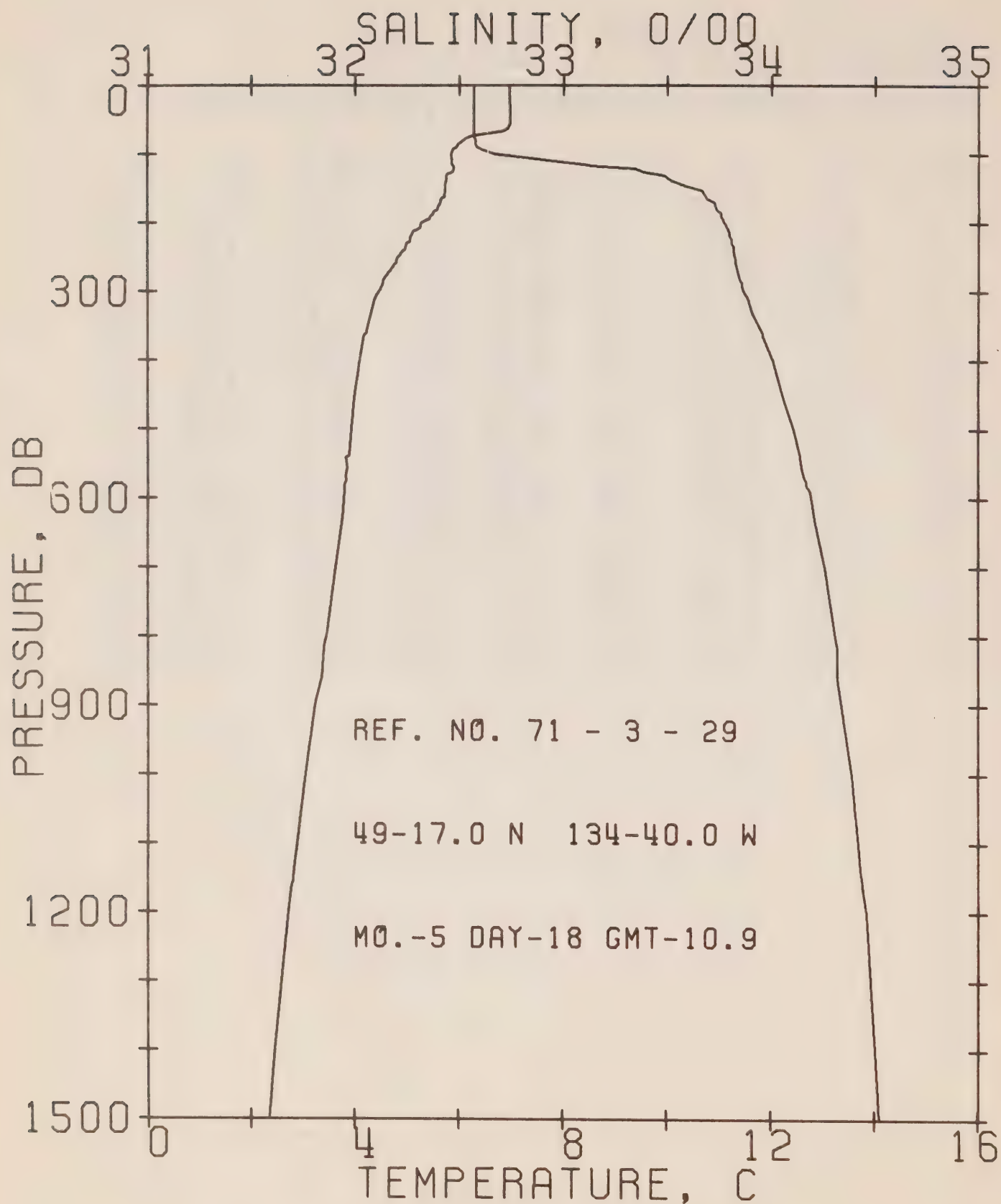
REFERENCE NO. 71- 3- 28

DATE 17/ 5/71

POSITION 49-40.0N, 142-40.0W GMT 12.2

RESULTS OF STP CAST 80 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.04	32.77	0	25.81	219.4	0.0	0.0	1472.
10	6.04	32.77	10	25.81	219.8	0.22	0.01	1472.
20	6.04	32.77	20	25.81	219.9	0.44	0.04	1473.
30	6.04	32.77	30	25.81	220.0	0.66	0.10	1473.
50	5.58	32.78	50	25.88	214.2	1.10	0.28	1471.
75	4.98	32.80	75	25.97	205.2	1.62	0.61	1469.
100	4.77	32.80	99	25.98	204.3	2.13	1.07	1469.
125	4.77	32.87	124	26.04	199.1	2.64	1.65	1469.
150	5.12	33.65	149	26.61	145.1	3.06	2.24	1472.
175	4.90	33.75	174	26.72	134.9	3.41	2.82	1472.
200	4.69	33.78	199	26.77	131.1	3.74	3.45	1471.
225	4.56	33.80	223	26.80	128.3	4.07	4.15	1471.
250	4.40	33.82	248	26.83	125.2	4.38	4.92	1471.
300	4.05	33.89	298	26.92	116.7	4.99	6.62	1470.
400	3.86	33.99	397	27.02	108.1	6.12	10.63	1471.
500	3.71	34.08	496	27.11	100.6	7.16	15.40	1473.
600	3.55	34.16	595	27.19	93.7	8.13	20.83	1474.
800	3.21	34.30	793	27.33	81.1	9.87	33.19	1476.
1000	2.93	34.37	990	27.41	74.1	11.43	47.42	1478.
1200	2.66	34.45	1188	27.50	66.4	12.83	63.08	1480.
1500	2.36	34.51	1484	27.57	60.2	14.72	89.09	1484.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 29

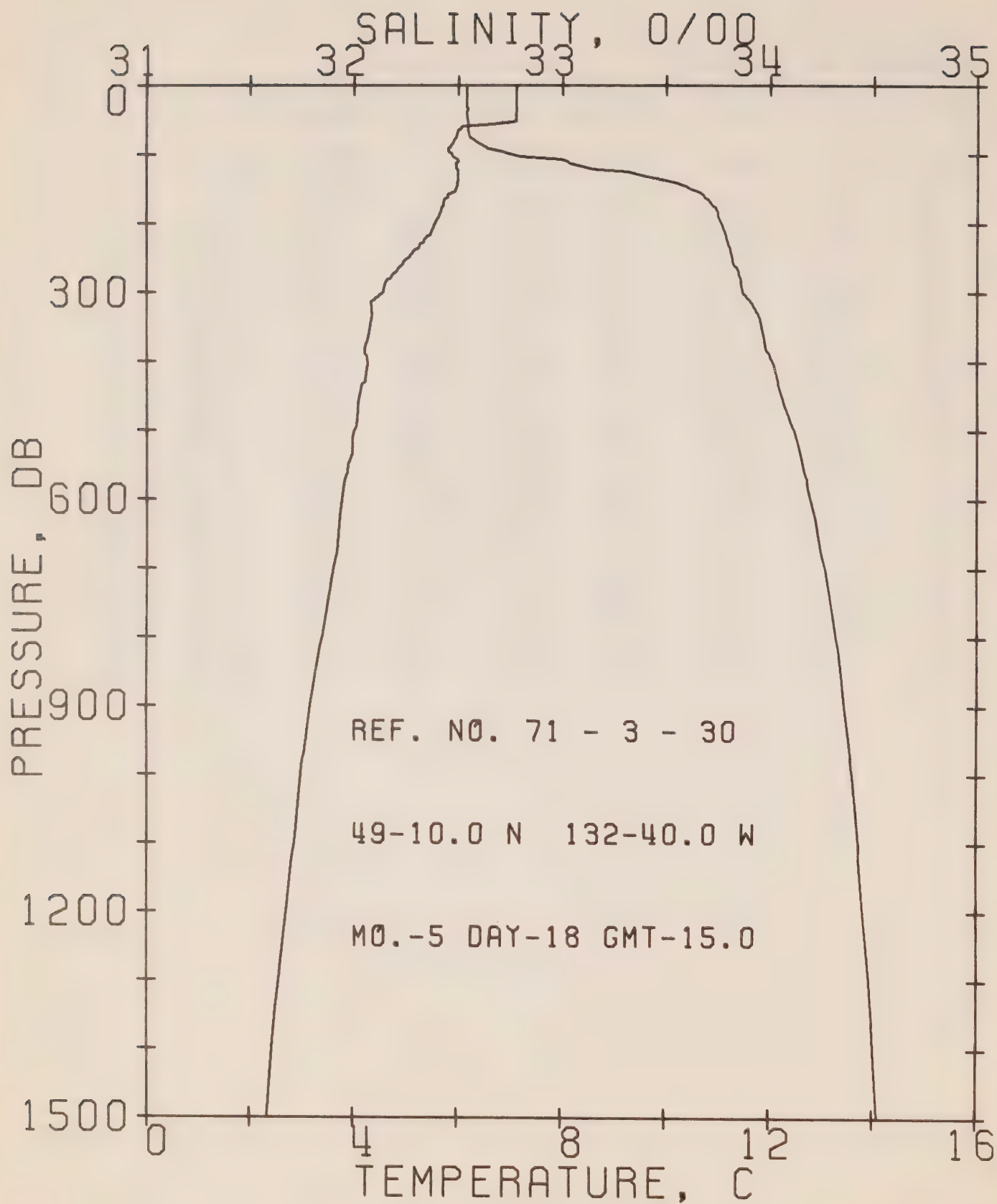
DATE 18/ 5/71

POSITION 49-17.0N, 134-40.0W GMT 10.9

RESULTS OF STP CAST 79 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.98	32.57	0	25.53	245.9	0.0	0.0	1476.
10	6.98	32.57	10	25.53	246.2	0.25	0.01	1476.
20	6.99	32.57	20	25.53	246.5	0.49	0.05	1476.
30	6.99	32.57	30	25.53	246.6	0.74	0.11	1476.
50	7.00	32.57	50	25.53	246.9	1.23	0.31	1477.
75	6.21	32.57	75	25.64	237.3	1.84	0.70	1474.
100	5.85	32.68	99	25.76	225.3	2.43	1.22	1473.
125	5.90	33.38	124	26.31	173.7	2.92	1.79	1475.
150	5.74	33.64	149	26.53	153.1	3.33	2.35	1475.
175	5.63	33.73	174	26.62	144.7	3.70	2.97	1475.
200	5.30	33.78	199	26.70	137.8	4.05	3.64	1474.
225	5.07	33.81	223	26.75	133.1	4.39	4.38	1473.
250	4.85	33.83	248	26.79	129.6	4.72	5.17	1473.
300	4.48	33.87	298	26.86	122.8	5.35	6.94	1472.
400	4.11	34.01	397	27.01	109.3	6.51	11.05	1473.
500	3.95	34.11	496	27.11	100.9	7.56	15.86	1474.
600	3.81	34.19	595	27.19	93.8	8.53	21.33	1475.
800	3.47	34.31	793	27.32	83.1	10.30	33.88	1477.
1000	3.05	34.39	990	27.42	74.0	11.88	48.32	1478.
1200	2.72	34.46	1188	27.50	66.4	13.29	64.10	1480.
1500	2.34	34.52	1484	27.58	59.2	15.17	89.94	1484.





PACIFIC OCEANOGRAPHIC GROUP

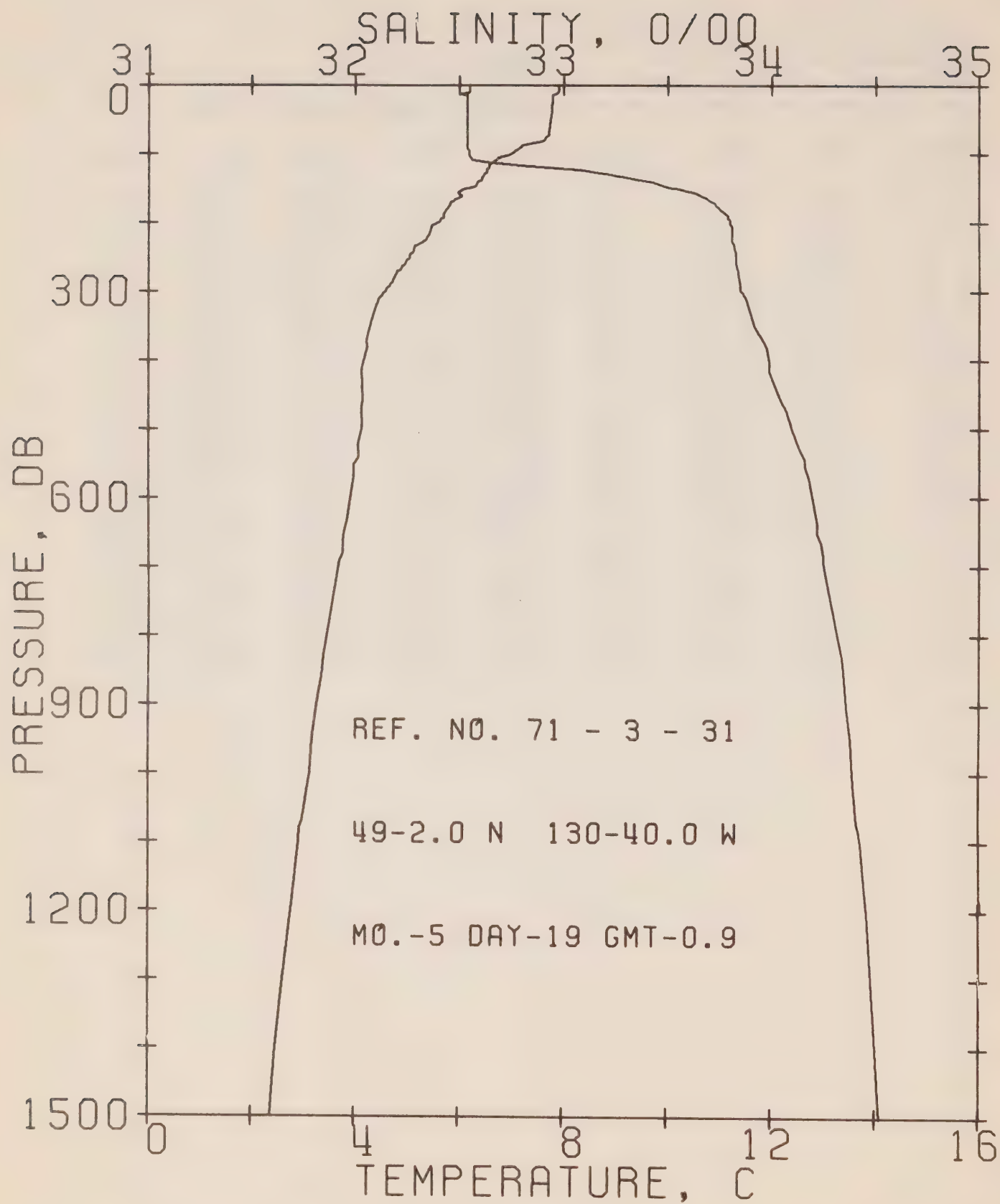
REFERENCE NO. 71- 3- 30

DATE 18/ 5/71

POSITION 49-10.0N, 132-40.0W GMT 15.0

RESULTS OF STP CAST 94 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.13	32.54	0	25.49	250.1	0.0	0.0	1476.
10	7.13	32.54	10	25.49	250.4	0.25	0.01	1476.
20	7.13	32.54	20	25.49	250.5	0.50	0.05	1477.
30	7.13	32.54	30	25.49	250.7	0.75	0.11	1477.
50	7.13	32.55	50	25.50	250.3	1.25	0.32	1477.
75	5.98	32.56	75	25.65	235.5	1.85	0.70	1473.
100	5.88	32.76	99	25.83	219.3	2.42	1.21	1473.
125	6.02	33.32	124	26.25	179.8	2.93	1.78	1475.
150	5.99	33.62	149	26.49	157.3	3.34	2.37	1476.
175	5.73	33.73	174	26.61	146.2	3.72	2.99	1475.
200	5.58	33.77	199	26.66	141.8	4.08	3.68	1475.
225	5.36	33.80	223	26.70	137.5	4.43	4.43	1475.
250	5.06	33.82	248	26.76	132.5	4.77	5.25	1474.
300	4.58	33.87	298	26.85	123.9	5.40	7.03	1473.
400	4.27	34.01	397	27.00	110.9	6.56	11.14	1473.
500	4.03	34.12	496	27.11	101.0	7.62	16.01	1474.
600	3.79	34.20	595	27.19	93.4	8.59	21.45	1475.
800	3.42	34.32	793	27.33	81.8	10.34	33.88	1477.
1000	2.99	34.40	990	27.43	72.6	11.88	47.94	1478.
1200	2.71	34.45	1188	27.50	67.0	13.27	63.56	1480.
1500	2.32	34.52	1484	27.59	59.0	15.15	89.33	1484.



PACIFIC OCEANOGRAPHIC GROUP

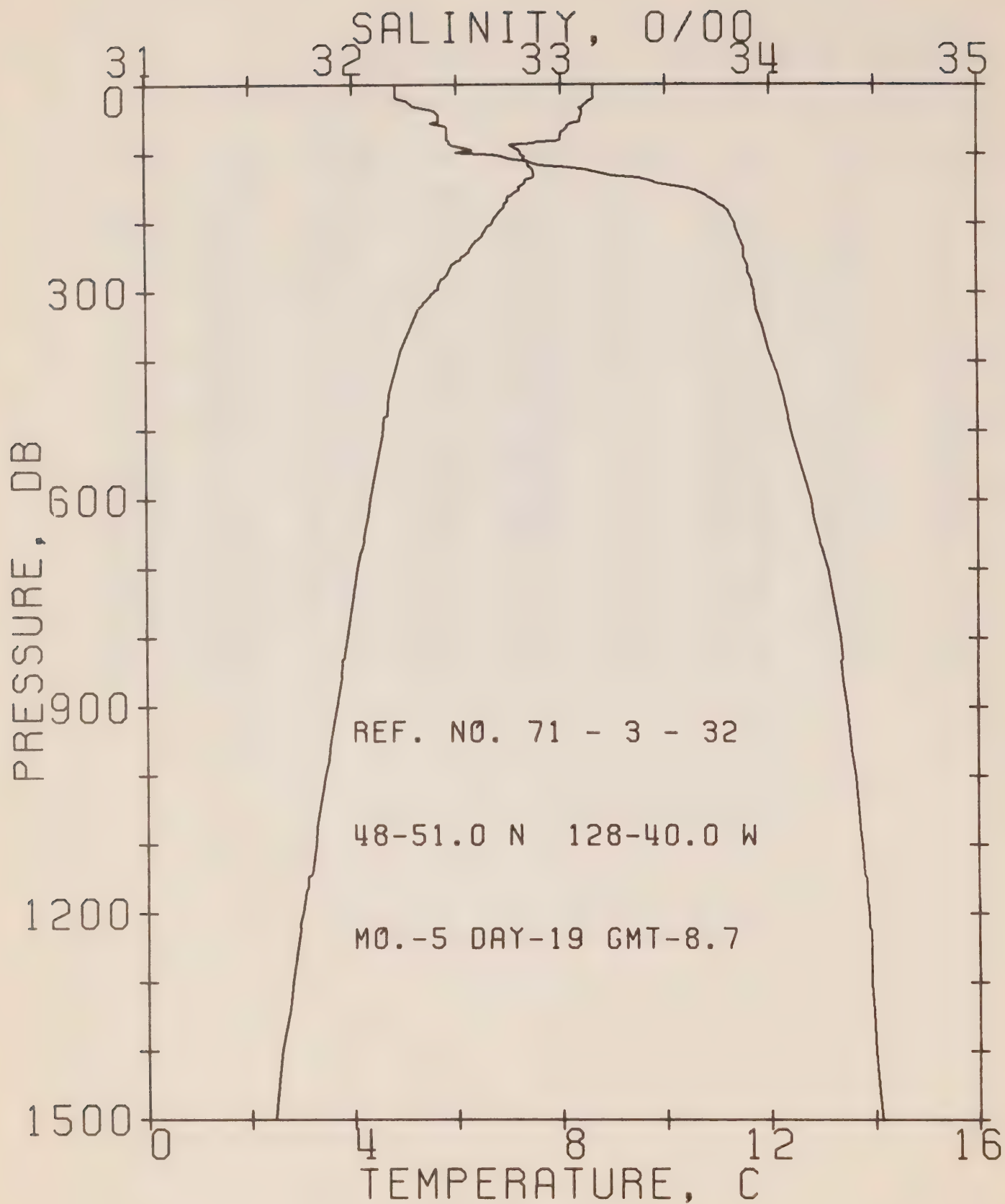
REFERENCE NO. 71- 3- 31

DATE 19/ 5/71

POSITION 49- 2.0N, 130-40.0W GMT 0.9

RESULTS OF STP CAST 90 POINTS TAKEN FROM ANALOG TRACE

FRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.92	32.55	0	25.39	259.8	0.0	0.0	1479.
10	7.93	32.54	10	25.38	260.7	0.26	0.01	1480.
20	7.82	32.54	20	25.40	259.6	0.52	0.05	1479.
30	7.81	32.54	30	25.40	259.7	0.78	0.12	1479.
50	7.78	32.54	50	25.40	259.5	1.30	0.33	1480.
75	7.71	32.54	75	25.41	259.0	1.95	0.74	1480.
100	7.02	32.55	99	25.51	249.4	2.58	1.31	1478.
125	6.55	33.12	124	26.02	201.1	3.16	1.97	1477.
150	6.20	33.53	149	26.40	166.2	3.62	2.61	1476.
175	5.84	33.74	174	26.60	147.1	4.01	3.25	1476.
200	5.63	33.80	199	26.68	140.2	4.36	3.93	1475.
225	5.38	33.81	223	26.71	136.7	4.71	4.68	1475.
250	5.06	33.83	248	26.77	131.9	5.04	5.49	1474.
300	4.60	33.86	298	26.84	124.9	5.68	7.29	1473.
400	4.18	33.99	397	26.99	111.5	6.86	11.46	1473.
500	4.15	34.10	496	27.08	103.7	7.94	16.40	1474.
600	3.93	34.20	595	27.18	94.9	8.92	21.92	1475.
800	3.47	34.32	793	27.32	82.4	10.70	34.54	1477.
1000	3.14	34.39	990	27.41	75.0	12.26	48.81	1479.
1200	2.77	34.46	1188	27.50	66.9	13.67	64.63	1481.
1500	2.36	34.52	1484	27.58	59.5	15.56	90.57	1484.





PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 32

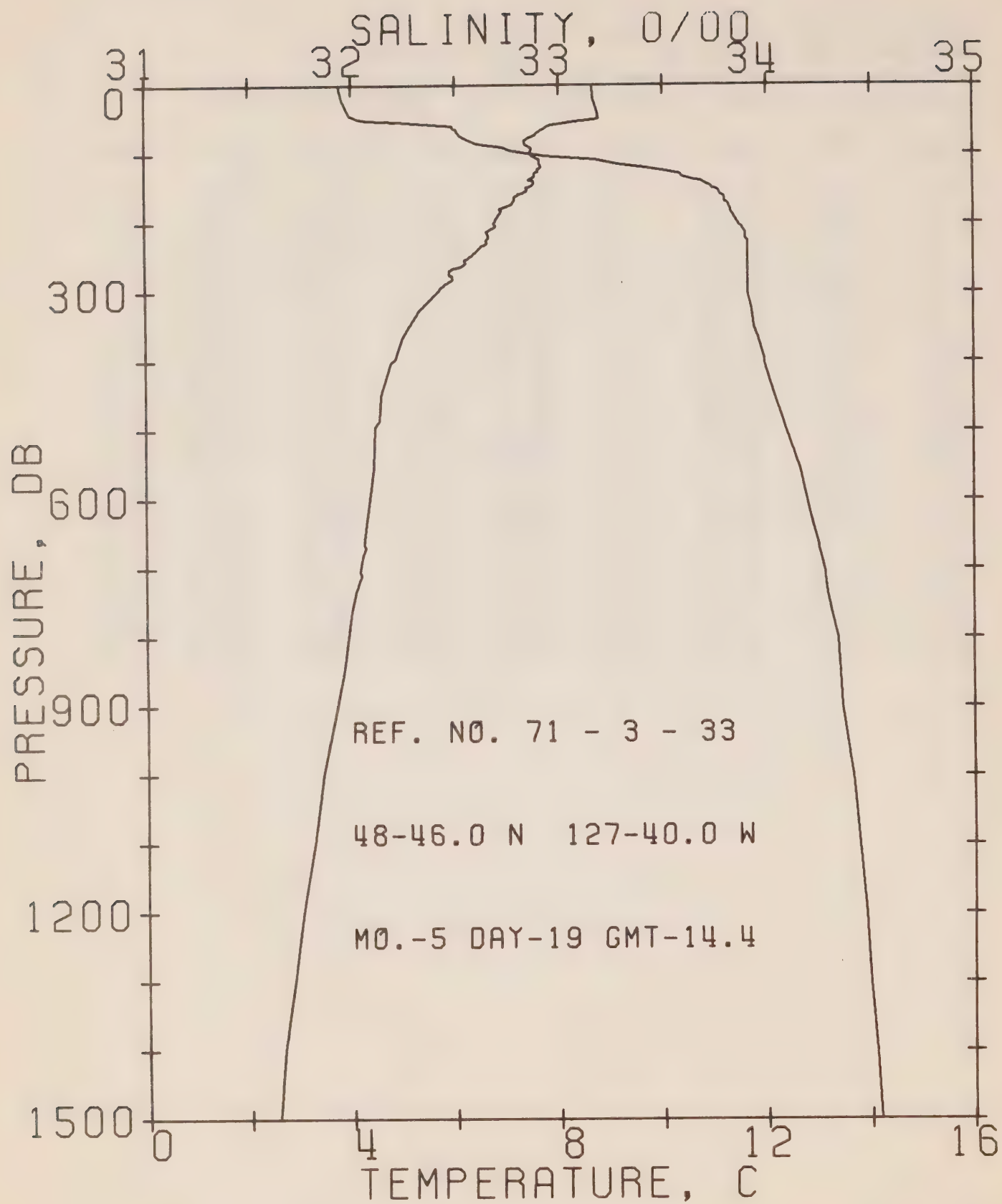
DATE 19/ 5/71

POSITION 48-51.0N. 128-40.0W GMT 8.7

RESULTS OF STP CAST 100 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.64	32.21	0	25.02	295.2	0.0	0.0	1482.
10	8.64	32.21	10	25.02	295.6	0.30	0.02	1482.
20	8.65	32.22	20	25.02	295.2	0.59	0.06	1482.
30	8.48	32.29	30	25.10	287.6	0.88	0.13	1482.
50	8.40	32.42	50	25.22	277.1	1.44	0.36	1482.
75	8.02	32.46	75	25.30	269.2	2.12	0.80	1481.
100	7.23	32.56	99	25.49	251.5	2.77	1.37	1478.
125	7.48	33.15	124	25.92	211.3	3.35	2.03	1481.
150	7.21	33.60	149	26.32	174.1	3.83	2.70	1480.
175	6.94	33.77	174	26.46	158.3	4.24	3.39	1480.
200	6.71	33.84	199	26.57	150.8	4.63	4.12	1480.
225	6.43	33.87	223	26.63	145.5	5.00	4.92	1479.
250	6.12	33.88	248	26.68	140.8	5.35	5.79	1478.
300	5.59	33.93	298	26.78	131.1	6.03	7.68	1477.
400	4.88	34.02	397	26.94	117.2	7.27	12.08	1476.
500	4.59	34.10	496	27.04	108.5	8.39	17.22	1476.
600	4.33	34.20	595	27.14	99.3	9.43	23.04	1477.
800	3.88	34.34	793	27.30	85.5	11.27	36.14	1479.
1000	3.44	34.41	991	27.40	76.9	12.91	51.09	1480.
1200	3.00	34.47	1188	27.49	68.7	14.37	67.43	1482.
1500	2.44	34.53	1484	27.58	59.7	16.30	93.96	1484.





PACIFIC OCEANOGRAPHIC GROUP

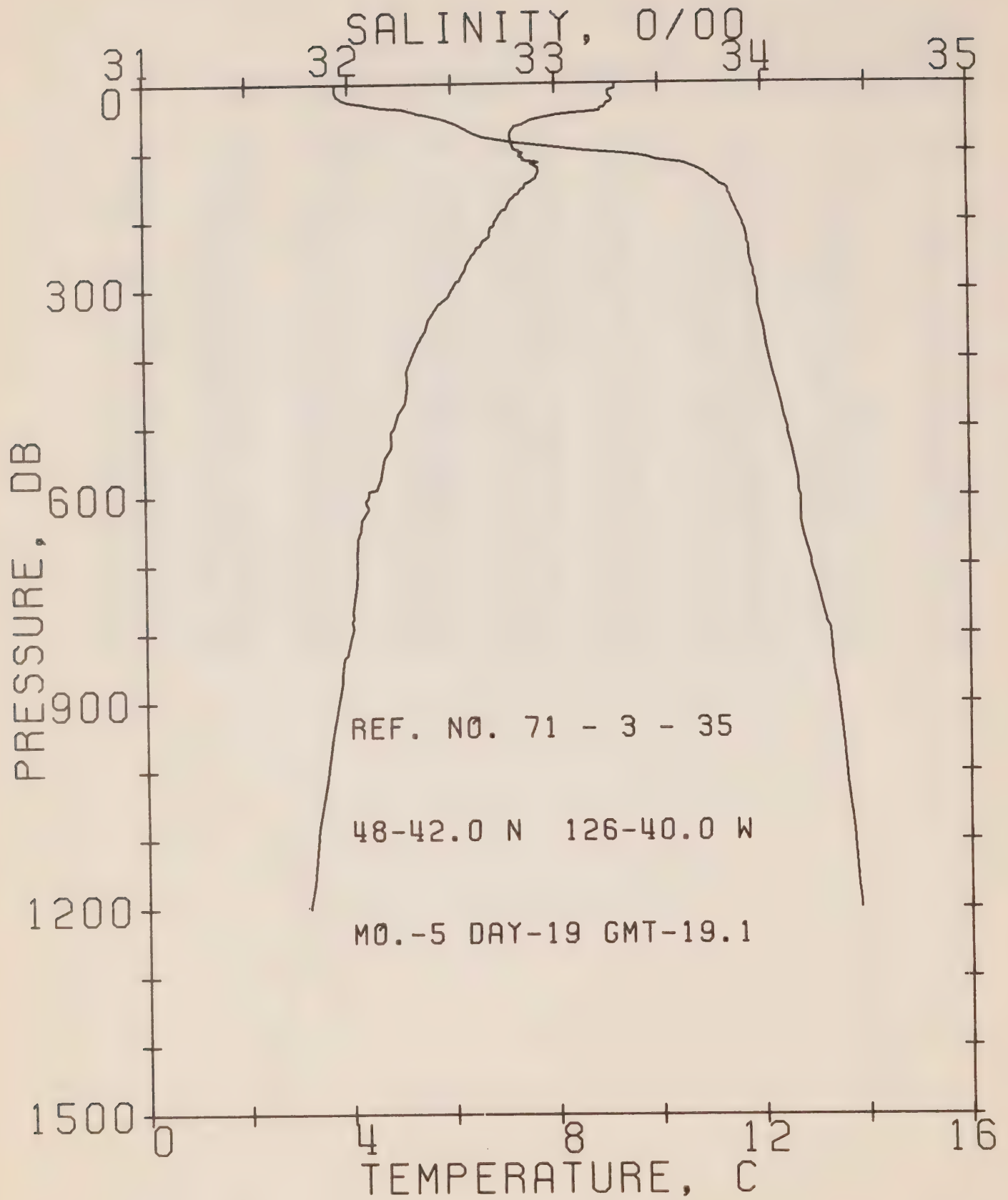
REFERENCE NO. 71- 3- 33

DATE 19/ 5/71

POSITION 48-46.0N, 127-40.0W GMT 14.4

RESULTS OF STP CAST 95 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.65	31.94	0	24.80	315.4	0.0	0.0	1481.
10	8.65	31.95	10	24.81	315.1	0.32	0.02	1482.
20	8.66	31.96	20	24.82	314.7	0.63	0.06	1482.
30	8.71	31.98	30	24.82	314.2	0.94	0.14	1482.
50	8.68	32.06	50	24.89	308.1	1.57	0.40	1483.
75	7.49	32.54	75	25.44	256.1	2.24	0.83	1479.
100	7.46	32.87	99	25.71	231.2	2.86	1.37	1480.
125	7.61	33.52	124	26.19	185.5	3.37	1.96	1482.
150	7.39	33.75	149	26.40	165.7	3.81	2.57	1481.
175	7.03	33.82	174	26.51	155.9	4.21	3.23	1480.
200	6.77	33.87	199	26.58	149.5	4.59	3.96	1480.
225	6.61	33.91	223	26.64	144.5	4.96	4.76	1480.
250	6.28	33.91	248	26.68	140.6	5.31	5.62	1479.
300	5.66	33.91	298	26.76	133.4	6.00	7.54	1477.
400	4.80	33.99	397	26.92	118.4	7.25	11.99	1475.
500	4.45	34.10	496	27.04	107.5	8.38	17.16	1476.
600	4.35	34.19	595	27.13	100.0	9.41	22.95	1477.
800	3.92	34.34	793	27.29	85.9	11.27	36.17	1479.
1000	3.42	34.41	991	27.40	76.6	12.92	51.18	1480.
1200	3.01	34.47	1188	27.49	68.8	14.37	67.49	1482.
1500	2.52	34.54	1484	27.59	59.8	16.30	93.90	1485.



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 35

DATE 19/ 5/71

POSITION 48-42.0N, 126-40.0W

GMT 19.1

RESULTS OF STP CAST 100 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.20	31.94	0	24.72	323.5	0.0	0.0	1484.
10	9.05	31.94	10	24.74	321.6	0.32	0.02	1483.
20	9.09	31.96	20	24.75	320.6	0.64	0.07	1483.
30	9.03	32.09	30	24.87	310.1	0.96	0.15	1484.
50	7.73	32.45	50	25.34	265.6	1.54	0.38	1479.
75	7.14	32.63	75	25.56	244.3	2.17	0.78	1478.
100	7.32	33.24	99	26.01	202.0	2.74	1.28	1480.
125	7.70	33.69	124	26.32	173.7	3.20	1.81	1482.
150	7.44	33.82	149	26.45	161.3	3.62	2.40	1482.
175	7.13	33.87	174	26.53	153.8	4.01	3.05	1481.
200	6.87	33.91	199	26.60	147.8	4.39	3.77	1480.
225	6.71	33.93	223	26.64	144.3	4.75	4.56	1480.
250	6.42	33.94	248	26.69	140.1	5.11	5.42	1479.
300	6.01	33.98	298	26.77	132.6	5.79	7.33	1479.
400	5.22	34.03	397	26.91	120.0	7.05	11.81	1477.
500	4.88	34.12	496	27.02	110.7	8.21	17.11	1478.
600	4.38	34.18	595	27.12	101.4	9.27	23.07	1477.
800	4.02	34.32	793	27.27	88.5	11.18	36.65	1479.
1000	3.53	34.40	991	27.38	78.9	12.85	51.92	1480.
1200	3.15	34.46	1188	27.47	71.2	14.34	68.66	1482.

PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 36

DATE 19/ 5/71

POSITION 48-38.0N, 126- 0.0W GMT 21.5

RESULTS OF STP CAST 30 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.84	31.68	0	24.57	337.6	0.0	0.0	1482.
10	8.83	31.68	10	24.57	337.8	0.34	0.02	1482.
20	8.64	31.70	20	24.62	333.5	0.67	0.07	1481.
30	8.60	31.74	30	24.65	330.2	1.01	0.15	1481.
50	7.26	32.78	50	25.66	234.6	1.55	0.37	1478.
75	7.42	33.40	75	26.12	191.2	2.08	0.71	1480.
100	6.90	33.72	99	26.45	160.7	2.52	1.10	1479.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	8.84	31.68	48.	7.23	32.73
7.	8.88	31.68	51.	7.28	32.81
8.	8.83	31.68	56.	7.30	32.89
10.	8.83	31.68	62.	7.38	33.11
13.	8.68	31.68	65.	7.37	33.11
15.	8.65	31.69	70.	7.45	33.33
24.	8.63	31.71	72.	7.41	33.36
30.	8.60	31.74	77.	7.42	33.42
30.	8.38	31.74	80.	7.41	33.50
32.	8.27	31.85	81.	7.43	33.51
34.	8.13	31.94	84.	7.42	33.53
38.	7.58	32.32	85.	7.34	33.54
41.	7.28	32.54	96.	7.13	33.67
43.	7.23	32.61	98.	6.97	33.69
47.	7.25	32.71	100.	6.90	33.72



PACIFIC OCEANOGRAPHIC GROUP

REFERENCE NO. 71- 3- 37

DATE 19/ 5/71

POSITION 48-33.0N, 125-33.0W GMT 23.7

RESULTS OF STD CAST 34 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.29	31.38	0	24.27	366.5	0.0	0.0	1483.
10	9.14	31.48	10	24.37	357.1	0.37	0.02	1483.
20	8.88	31.82	20	24.67	328.2	0.70	0.07	1482.
30	8.29	32.27	30	25.12	286.1	1.01	0.15	1481.
50	7.39	32.91	50	25.75	226.8	1.53	0.36	1479.
75	7.03	33.36	75	26.15	188.8	2.05	0.69	1478.

PRESS	TEMP	SAL	PRESS	TEMP	SAL
0.	9.29	31.38	44.	7.63	32.65
7.	9.30	31.38	45.	7.58	32.70
8.	9.27	31.38	46.	7.46	32.78
9.	9.19	31.42	50.	7.39	32.91
12.	9.04	31.60	55.	7.37	32.97
15.	8.88	31.74	56.	7.34	33.00
20.	8.88	31.82	59.	7.34	33.14
23.	8.73	31.99	63.	7.34	33.17
27.	8.58	32.19	67.	7.31	33.20
28.	8.37	32.24	69.	7.23	33.22
29.	8.31	32.26	71.	7.23	33.27
33.	8.24	32.32	73.	7.18	33.29
35.	8.08	32.36	74.	7.09	33.33
38.	7.83	32.42	75.	7.03	33.36
40.	7.67	32.54	82.	6.98	33.40
40.	7.67	32.60	85.	6.93	33.42
43.	7.66	32.64	88.	6.83	33.50





SURFACE TEMPERATURE AND SALINITY OBSERVATIONS  
(P-71-3)

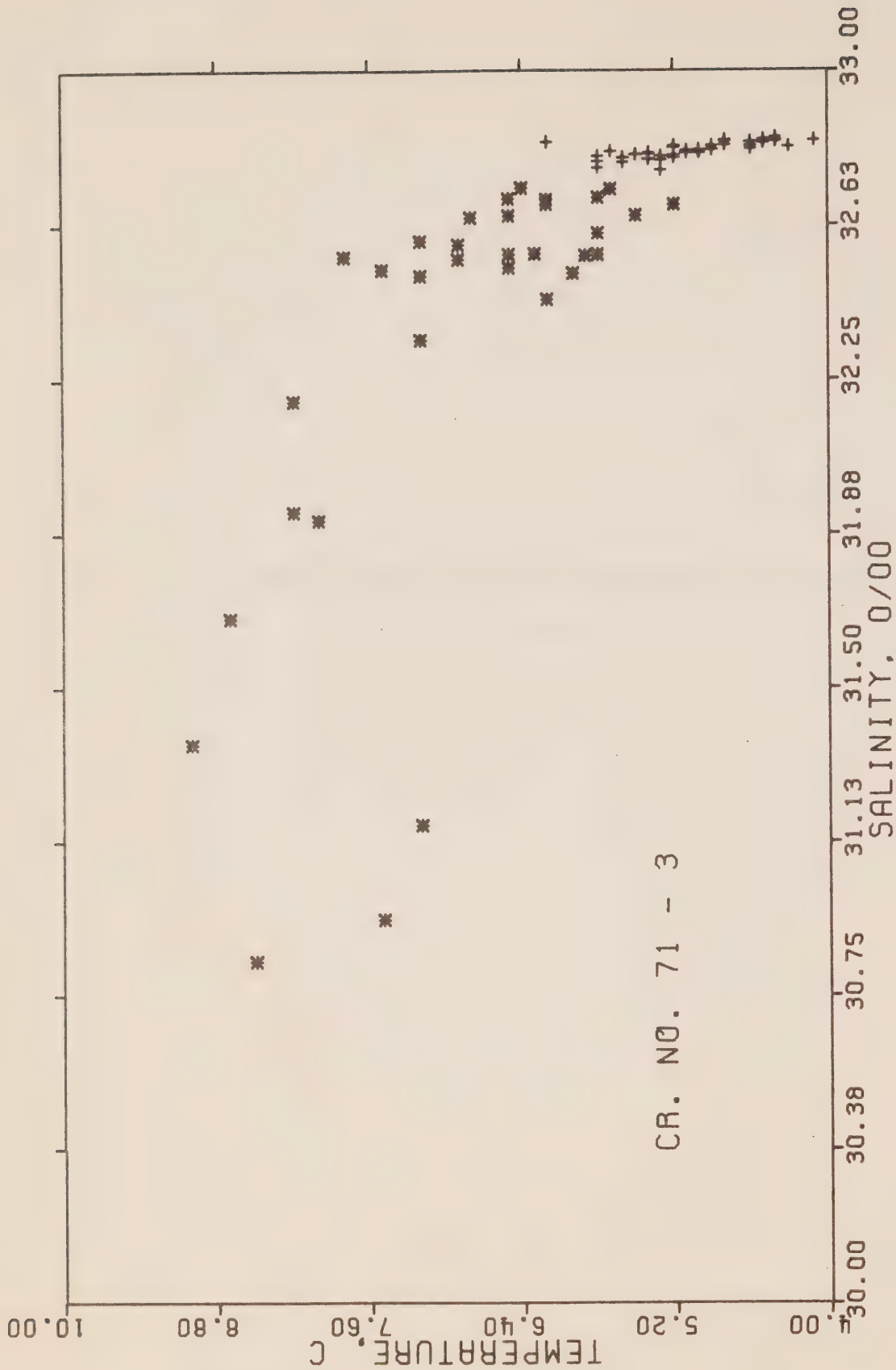


Fig. 25 T-S plot of surface temperature and salinity observations on Line P (asterisks) and at Station P (pluses) during Cruise P-71-3.

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 3

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
71	4	3	0	30.832	8.5	125-33
71	4	3	145	30.933	7.5	126- 0
71	4	3	400	31.164	7.2	126-40
71	4	3	745	32.746	7.2	127-40
71	4	3	1320	32.552	6.5	128-40
71	4	3	1700	32.520	6.5	129-40
71	4	3	2000	32.554	6.3	130-40
71	4	3	2345	32.506	6.0	131-40
71	4	4	240	32.554	5.8	132-40
71	4	4	610	32.550	5.9	133-40
71	4	4	940	32.551	5.8	134-40
71	4	4	1300	32.443	6.2	135-40
71	4	4	1530	32.604	5.8	136-40
71	4	4	2110	32.648	5.5	137-40
71	4	4	2345	32.712	5.7	138-40
71	4	5	320	32.691	5.8	139-40
71	4	5	610	32.674	5.2	140-40
71	4	5	935	32.784	5.4	141-40
71	4	6	0	32.803	5.7	ON STATION
71	4	7	0	32.808	4.6	ON STATION
71	4	8	0	32.814	4.3	ON STATION
71	4	9	0	32.830	4.4	ON STATION
71	4	10	0	32.830	4.1	ON STATION
71	4	11	0	32.836	4.4	ON STATION
71	4	12	0	32.816	4.6	ON STATION
71	4	13	0	32.823	4.5	ON STATION
71	4	14	0	32.831	4.5	ON STATION
71	4	15	0	32.831	4.5	ON STATION
71	4	16	0	32.827	4.4	ON STATION
71	4	17	0	32.823	4.5	ON STATION
71	4	18	0	32.816	4.6	ON STATION
71	4	20	0	32.825	4.6	ON STATION
71	4	21	0	32.827	4.8	ON STATION
71	4	22	0	32.818	4.8	ON STATION
71	4	23	0	32.830	4.8	ON STATION
71	4	24	0	32.817	4.9	ON STATION
71	4	25	0	32.807	4.9	ON STATION
71	4	26	0	32.807	4.9	ON STATION
71	4	27	0	32.803	5.0	ON STATION
71	4	28	0	32.800	5.4	ON STATION
71	4	29	0	32.814	5.2	ON STATION
71	4	30	0	32.826	6.2	ON STATION
71	5	1	0	32.816	5.2	ON STATION
71	5	2	0	32.800	5.0	ON STATION
71	5	4	0	32.813	5.2	ON STATION
71	5	5	0	32.799	5.1	ON STATION
71	5	6	0	32.793	5.2	ON STATION
71	5	7	0	32.788	5.2	ON STATION
71	5	8	0	32.805	5.1	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS  
CRUISE REFERENCE NUMBER 71- 3

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
71	5	8	0	32.805	5.1	ON STATION
71	5	9	0	32.807	5.0	ON STATION
71	5	10	0	32.797	5.4	ON STATION
71	5	11	0	32.792	5.8	ON STATION
71	5	12	0	32.796	5.5	ON STATION
71	5	13	0	32.789	5.6	ON STATION
71	5	14	0	32.791	5.3	ON STATION
71	5	15	0	32.790	5.2	ON STATION
71	5	16	0	32.782	5.3	ON STATION
71	5	17	0	32.777	5.6	ON STATION
71	5	17	630	32.778	5.8	143-40
71	5	17	1115	32.764	5.8	142-40
71	5	17	1715	32.759	5.3	141-40
71	5	17	1930	32.686	6.5	140-40
71	5	17	2225	32.673	6.2	139-40
71	5	18	30	32.713	6.4	138-40
71	5	18	245	32.685	6.2	137-40
71	5	18	515	32.645	6.5	136-40
71	5	18	735	32.641	6.8	135-40
71	5	18	1010	32.577	6.9	134-40
71	5	18	1335	32.586	7.2	133-40
71	5	18	1500	32.541	6.9	132-40
71	5	18	2015	32.501	7.2	131-40
71	5	19	0	32.549	7.8	130-40
71	5	19	410	32.516	7.5	129-40
71	5	19	755	32.198	8.2	128-40
71	5	19	1215	31.906	8.0	127-40
71	5	19	1800	31.927	8.2	126-40
71	5	19	2130	31.668	8.7	126- 0
71	5	19	2326	31.361	9.0	125-33





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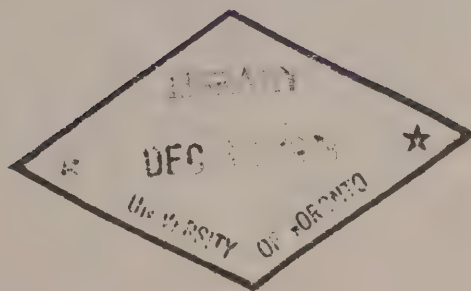
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# AN EVALUATION OF THE TRISPONDER POSITIONING SYSTEM

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AN EVALUATION OF THE  
TRISPONDER POSITIONING SYSTEM

BY

A. MORTIMER

JANUARY 1972



# A B S T R A C T

## An Evaluation of the Trisponder Positioning System

By

A. Mortimer

A series of tests made to evaluate the Trisponder Positioning System for use in hydrographic survey is described. The accuracy, range and operational characteristics are assessed. The various antenna configurations available for use with this system are described.





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## INTRODUCTION

The Trisponder Positioning System, Model 202A, is a line of sight range-range, positioning system, operating in the X-band range of frequencies. The system was loaned by ComDev Marine (C.D.C.) to the Development Group, Pacific Region, Canadian Hydrographic Service, to be evaluated for hydrographic use. The Development Group assessed the accuracy and operational range of the system, the effect of radar interference on the signal stability, and the operational suitability of the system for inshore hydrographic surveys.

The Development Group had the use of the Trisponder system from the 12th July to the 9th August and from the 9th November to the 21st December 1971. The second period of evaluation was necessary as the transponders had not operated efficiently during the summer, also two new antennae were available for testing. All tests were made in the Victoria area. (See diagram #13)

In these evaluations, only one position line generated by the Trisponder was considered; the accuracy of a position depending on the geometry in which the system is deployed.





## THE EQUIPMENT

The Trisponder Positioning System consists of a distance measuring unit, a base unit and up to four transponders. Other peripheral equipment, such as printers and repeaters are also available.

### THE DISTANCE MEASURING UNIT (D.M.U.)

This unit is a light, portable, splash-proof box (16 x 12 x 8 1/2 inches). Ranges from two transponders are displayed on seven-bar digital display tubes in kilometres and metres, to a resolution of ten metres or one metre. The controls for the system are on the face of the D.M.U. It is powered by two 12 volt batteries with a consumption of 1.5 amps at 24 volts.

The functions of the electronics inside the D.M.U. are to:

1. establish an R.F. link with a transponder;
2. determine if the received range signal is valid by checking its pulse repetition frequency (P.R.F.);
3. time the round trip of a pulse with a 29.971 mega hertz (mhz) clock, and account for transponder delay;
4. accumulate ten valid range readings for one metre resolution;
5. reinitiate the sequence if ten valid readings are received, or if fifty readings are rejected;
6. display accumulated data;
7. repeat for a second transponder.

All tests were conducted using one metre resolution on the display. The D.M.U. functioned well during the tests, however, some salt water corrosion necessitated the replacement of three of the range display tubes.



## THE BASE UNIT

The base unit is a transceiver operating at the control of the D.M.U. It is powered from the D.M.U.; the two units being connected by co-axial cable. A short length of waveguide connects the transceiver to an omni antenna. By placing the transceiver in the same unit as the antenna, long lengths of waveguide are eliminated and the system's portability is increased. The base unit was mounted on a mast giving an antenna height of 9 ft. for launch operations. No trouble was experienced from this unit for the period of the tests.

## THE TRANSPONDERS

Up to four transponders can be deployed at known shore stations. Any two of the four can be interrogated simultaneously from the D.M.U. These units are composed of an antenna, a transceiver and decoder. The decoder will accept only signals with a precisely controlled P.R.F. The use of a precise P.R.F. enables the system to distinguish between transponders and to eliminate much radar interference.

Power is supplied to the transponder from two 12 volt batteries. Power consumption is at the rate of 1.2 amps. At this rate of consumption, two 90 amp/hour batteries could theoretically maintain the transponders for 2 1/2 days operation in the field. However, it was found that two days unattended operation of the transponders was all that was practical, without excessively discharging the batteries. If a transponder site is to be occupied for any length of time, it may be practical to use thermo-electric generators to keep the batteries charged.

The range and accuracy obtained from the Trisponder positioning system depends upon the efficient operation of the transponders. During the test period, five transponders were used. Only two of the five transponders maintained efficient operation for any length of time. These



two transponders, after careful "tuning" by a C.D.C. engineer, remained in efficient operation for four weeks until the end of the tests. During the tests in July and August, the transponders were functioning at low efficiency. Therefore, the maximum range for reception of a stable signal was as low as 12 kilometres (kms). The tests at the beginning of November gave similar results. After the transponders had been "set up" by a C.D.C. engineer, the maximum range for reception of a stable signal was 20 kms in the centre of the antenna beam pattern.

New transponders are being developed for the Trisponder system and these new units may prove to be more reliable than those currently in use.

BASE UNIT ANTENNA (See diagram #9)

This antenna is a circular waveguide slotted array. It has a pattern of 360° in the horizontal plane, and 15°, to half power points, in the vertical plane. It has a gain of 6 decibels (db). The radiation pattern (vertical plane) for this antenna is shown on diagram #14. This antenna is mounted above the base unit on the launch.

For launch use, the 15° vertical beam width of the omni antenna allows the vessel to roll to less than 7 1/2° at long ranges before signal degradation takes place. To measure the effect of the omni antenna moving in a vertical plane, tests were made ashore at ranges of 15 kms and 1.2 kms. At 15 kms, moving the antenna from the vertical to 7° off vertical (with no horizontal movement) these tests showed an increase in instability from ±1.2 metres to ±5.2 metres, and an increase in the mean measured distance of +12 metres. At a range of 1.2 kms it was possible to move the antenna more than 7° off vertical without degrading signal. The data from both these tests is listed on diagram #21.





An omni antenna with a 30° vertical beam width is at present under development for the Trisponder system. This new antenna should provide a better quality signal in a moving launch. The new antenna's gain is reported to be 6 db; therefore, the overall range of the system should not be affected.

#### TRANSPONDER ANTENNAE

##### 45° Antenna (See diagram #10)

This antenna is a small directional horn antenna with a gain of 16 db. It has a beam of 45° to half power points, in both the horizontal and vertical planes. The radiation pattern (horizontal plane) for this antenna is shown on diagram #15. The wide vertical beam pattern makes this antenna suitable for use in helicopter operations, but much of the signal strength is wasted when using a surface vehicle.

The horizontal beam pattern of the 45° antenna has been defined for stability when used in conjunction with a launch (see diagram #1). The tests to define the usable area of coverage of this antenna were limited by both low antenna heights, and by inefficiency of transponder operation. The diagram, therefore, presents a conservative estimate of the system's capability when using this antenna.

##### 60° Antenna (See diagram #11)

This antenna is a large directional horn antenna with a gain of 13 db. It has a horizontal beam width of 60° to half power points and a vertical beam width of 12° to half power points. The radiation pattern (horizontal plane) for this antenna is shown on diagram #16. It is a cumbersome antenna, about 18 inches (ins.) long and up to 10 ins. in height. During the tests, the signal from this antenna was lost well before line of sight was reached. The area of coverage of a usable signal from this antenna is shown on diagram 2. The maximum range for the system, using the 60° antenna, was found to be 13 kms.



### 84° Antenna (See diagram #12)

This antenna is a rectangular slotted waveguide array, with a gain of 17 db. To half power points, it has a horizontal beam width of 84° and a vertical beam width of 5°. The radiation pattern (horizontal plane) for this antenna is shown on diagram #17. The narrow vertical beam is adequate for surface use if the transponder is level.

Tests were made for accuracy and stability of the system throughout the beam pattern of the 84° antenna. Diagram numbers 3 and 4 illustrate this coverage. Because of its wide horizontal beam width and higher gain, this antenna appears to be the best suited, of the three antennae tested, for use in inshore hydrographic survey.

### INSTALLATION AND OPERATION

The Trisponder system is very portable and easily installed. The base unit and the transponders can be mounted on standard tripod fittings. The only consideration to be made when setting up these units is that they be placed so as to be well clear of any obstructions.

The operation of the D.M.U. is simple and all controls are clearly labelled and their functions obvious.

Calibration of the system is achieved by comparing the measurement given by the Trisponder over a short baseline to the accurate known measurement for that base. The range displays are then adjusted to show the correct distance. Residual errors from calibration are small when compared to other errors in the system.

### METHOD OF TESTS

#### Range and Stability

To establish the operational stability of the Trisponder system at various ranges, a launch was steered along an arc of constant range from a



transponder. The observed range was noted at approximately five second intervals. As a launch cannot be steered exactly along an arc, and because of fluctuations in the range indicated by the Trisponder, it was necessary to fit a curve to the data to estimate the launch's actual movement. The differences between the estimated launch line and the observed Trisponder readings were taken as a measure of signal stability. (This technique was used for the evaluation of the Motorola Range Positioning system.) For the tests of the 45° horn antenna, the differences were found graphically. For the 60° and 84° antennae, a very close series of linear regressions were computed from the raw Trisponder data to estimate the launch's movement. The residuals from these regressions were taken as a measure of the instrument's stability. The algorithm for the computer program to process stability data is given on diagram #18. An example, from the computer print-out, of a launch line estimated from observed Trisponder data is shown on diagram #19. When the graphical and computed methods were compared, little difference was found in the results. In both cases, for the purpose of computing the estimated launch line only, radar interference and other large erroneous readings were filtered out.

The stability tests were made by running launch lines over short arcs at the centre of the antenna beam pattern for various transponder heights. These heights ranged from 18 feet to 130 feet, with a launch antenna height of 9 feet. For tests at ranges greater than 21 kms, a launch antenna height of 15 feet was used. The data obtained from these tests is tabulated on diagram #5.

The limits of the beam pattern generated by the 45° horn antenna were defined for stability with this method. In this case, stability lines were run throughout the beam pattern. Diagram #1 shows a  $\pm 5$  metre contour for stability of the system. Beyond the  $\pm 5$  metre contour, the stability of the signal decays rapidly.

The stability of the beam pattern generated by the 84° and the 60° horizontal beam width antennae are shown on diagrams #2 and #4. The contours on these diagrams were developed from stability lines run at





various ranges, and from data obtained on tests ashore. Tests ashore were made over four base lines. A set of Trisponder observations was taken with transponder antenna pointing at the receiver. The transponder antenna was then turned through  $30^\circ$  increments, sets of readings being taken at each increment, until the signal was lost. For each set of readings, the standard deviation was calculated. The angle and range at which there was a marked increase in the standard deviation of the sets was taken as the limit of stable signal for the beam pattern.

### Precision

To assess the precision of the Trisponder Positioning System, sets of readings were taken over ten base lines. The base lines had been previously measured by tellurometer. These measurements were made at the centre of the beam pattern of the  $45^\circ$  antenna. The median, mean and standard deviation of each set of observations, for both transponders, were calculated. The differences between the tellurometer distances and the Trisponder data are tabulated on diagram #6. One set of observations at 21 kms showed the effect of extreme pulse decay. Another set, at 15 kms, also seems to indicate attenuation due to the proximity of the bases to line of sight or to transponder inefficiency. A set of observations at 3 kms was affected by intense radar activity. The root mean square (R.M.S.) error for the observations (excluding the one set suffering extreme pulse decay) was  $\pm 3.3$  metres. The R.M.S. error for all observations not affected by pulse decay or radar interference was  $\pm 2.8$  metres.

To establish if the precision found at the centre of the antenna beam was maintained throughout the beam pattern, further tests were made.

For the  $45^\circ$  horn antenna, these tests were conducted from a launch. At several ranges from the transponders, sets of simultaneous observations were made with both transponders pointing at the launch. One transponder was then turned to  $22^\circ$  and  $45^\circ$ , and sets of simultaneous observations were taken to compare the signal from the offset transponder to the signal at



centre beam. The data obtained from these tests is tabulated on diagram #7. The observations were corrected to eliminate any errors arising from differences in calibration of the two transponders and for the short distance separating the two transponders.

For the  $84^\circ$  horizontal beam width antenna, the tests to define the precision throughout the beam pattern were conducted over four base lines ashore. Sets of Trisponder distances were taken at 15, 12, 9 and 5 kms. At each range, up to seven sets were observed by turning the transponder from centre beam through  $30^\circ$  increments, to cover the beam pattern. The results are tabulated on diagram #7, and an example of the computer print-out for the precision tests is shown on diagram #20. Similar data was also obtained for the  $60^\circ$  horn antenna.

Precision tests, for the three transponder antennae, indicate that systematic errors exist in observed Trisponder ranges. These errors are negative and increase away from the centre of the beam until the effect of pulse decay becomes appreciable at the edges of the beam. At the edges of the beam, where pulse decay takes over, the error becomes positive and large. Also, the indicated range is very unstable at the edges of the beam. Diagram #3 shows contours for these errors. They have been treated as being random, as it is at present impractical to carry out lengthy calibration procedures or to allow for these errors when using the system in the field.

#### Repeatability

To check the repeatability of the Trisponder, the system was taken at approximately weekly intervals to the same short base line (1196.6 metres), where sets of observed ranges were taken. If necessary, a calibration adjustment was then made and another set of readings noted. The difference between the after-calibration readings and the before-calibration readings over the seven day interval were taken as a measure of the system's repeatability. This difference, on two occasions, exceeded one metre. When the tests were completed, it became apparent that if the drift exceeded one metre, then the transponders' efficiency had decreased



considerably. The transponders did, in fact, drift as much as 2.7 metres.

### Radar Interference

The approaches to Victoria, where the Trisponder tests were conducted, are subject to intense radar activity. At short and medium ranges, radar interference is easily detected by continuous monitoring of the display. Radar interference was observed to cause large errors in up to 4% of the displayed ranges. At the edges of an antenna's beam pattern, radar interference cannot be isolated from the effects of attenuation.

Two instances of radar interference are given to exemplify the problem:

1. When comparing the Trisponder to a tellurometer measured base line (3.0 kms), at least six large naval vessels were operating in the immediate area. The standard deviation of the observed ranges, obtained in this test, was double that usually found at this short range.
2. When running a short launch line to assess the system's stability at 12 kms from the transponders, a destroyer escort was operating in close proximity to the launch. Radar interference, assumed to be from this source, increased the system's instability to  $\pm 10$  metres, from  $\pm 1$  metre found on another occasion at this range.

## RESULTS

### Range and Stability

There is a marked breakdown in the stability obtained from the Trisponder positioning system as:

1. line of sight is approached.
2. the edges of the antenna beam pattern are reached.
3. the system's maximum range is reached.





The range at which a stable signal can be received appears to be about 10% less than the range derived from the formula

$$\text{Range} = 1.22 \left( \sqrt{\text{Height}_1} + \sqrt{\text{Height}_2} \right)$$

(Heights are for the transponders and base unit antenna  
Range in nautical miles, heights in feet)

It is not unusual to obtain a stability of signal of  $\pm 2$  metres well within the beam. Towards the edges of the pattern, the instability increases to  $\pm 5$  metres. From there on out the signal rapidly becomes unusable.

The system has a maximum advertised range of 24 kms. Stability data obtained at 24 kms shows an instability of  $\pm 10$  metres, at the centre of the antenna beam. At 20 kms the instability was found to be  $\pm 3$  metres. There is a marked decline of stability between 20 and 24 kms, which suggests that the maximum operational range for launch use is about 20 kms.

The R.M.S. stability for all tests made within 20 kms of the transponder, including those affected by radar interference was  $\pm 3.8$  metres ( $E_1$ ). When comparing the three transponder antennae, range is directly affected by antenna gain. The  $60^\circ$  horizontal beam width antenna was found to have a maximum range of about 12 kms. The  $84^\circ$  and  $45^\circ$  antennae have ranges to the power limits of the system.

### Precision

By combining the results of precision tests at all ranges and angles within stable signal range of a transponder, an estimate of the Transponder system's precision can be made. An R.M.S. error of  $\pm 3.1$  ( $E_2$ ) metres was found from averaged observations for all parts of the beam pattern. There is no significant difference in the results of the precision tests for the three transponder antennae.



### Repeatability

If calibration checks are made frequently (weekly), and if the transponders remain "in tune", the drift with time of the Trisponder system should not exceed  $\pm 1$  metre ( $E_3$ ).

### Overall Accuracy

By summing the results of the tests for stability, precision and repeatability, an estimate of the Trisponder system's accuracy can be made.

$$\text{If Total Error} = \pm \sqrt{E_1^2 + E_2^2 + E_3^2}$$

then, for one position line developed by this system, an R.M.S. error of  $\pm 5$  metres can be expected. At the fringes of an antenna's beam pattern, the error can be expected to increase to  $\pm 7$  metres before the signal becomes unusable. Diagram #8 shows contours derived from the combined tests for the accuracy of the Trisponder system, for one position line only.



## CONCLUSIONS

1. The transponders used with the Trisponder system were the only major source of trouble encountered during the tests. Their record for reliability is poor. However, a new transponder is being developed which may prove to be more satisfactory. At all times, for efficient operation of the system, the transponders must be kept in tune.

2. Of the antennae used with the transponders, the 84° horizontal beam width antenna is the most suitable for hydrographic survey.

The 15° vertical beam width omni antenna used on the launch limits the system's stability at long ranges. A 30° vertical beam width omni antenna, at present being developed, should prove more suitable if it has a 6 db gain.

3. The D.M.U. and the base unit operated efficiently throughout the tests. The D.M.U. provides a good display and simple controls. The absence of waveguide makes these two units easily portable.
4. The power consumption of the transponders is rather high. For field use, the transponders would have to be serviced every two days, which may prove to be operationally inconvenient.
5. The Trisponder system is capable of displaying ranges from any two of four transponders. This feature could have advantages for use on specialized surveys.
6. Radar interference did not appear to be a major problem during the tests, although at times it was necessary to suspend operations until the source of the interference was out of the working area.





7. The Trisponder Positioning System will provide position lines with an accuracy of  $\pm 5$  metres within the beam pattern of the antenna used, and of  $\pm 7$  metres at the fringes of the beam pattern. For these accuracies it has a maximum range of 20 kms.



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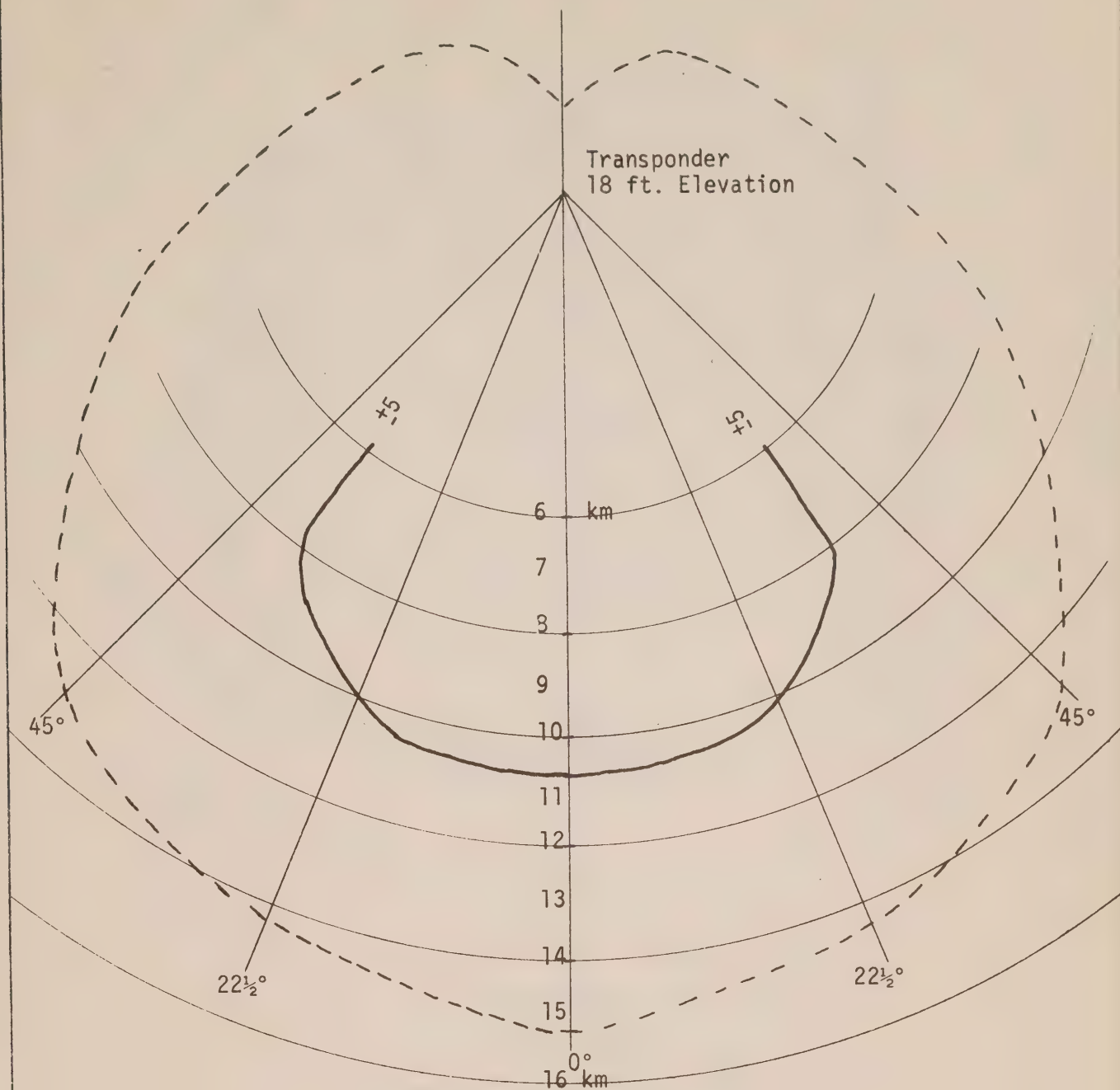
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I L L U S T R A T I O N S







Transmitter Antenna Height 9 ft.

Range of Signal Loss ---

Range of Stable Signal —

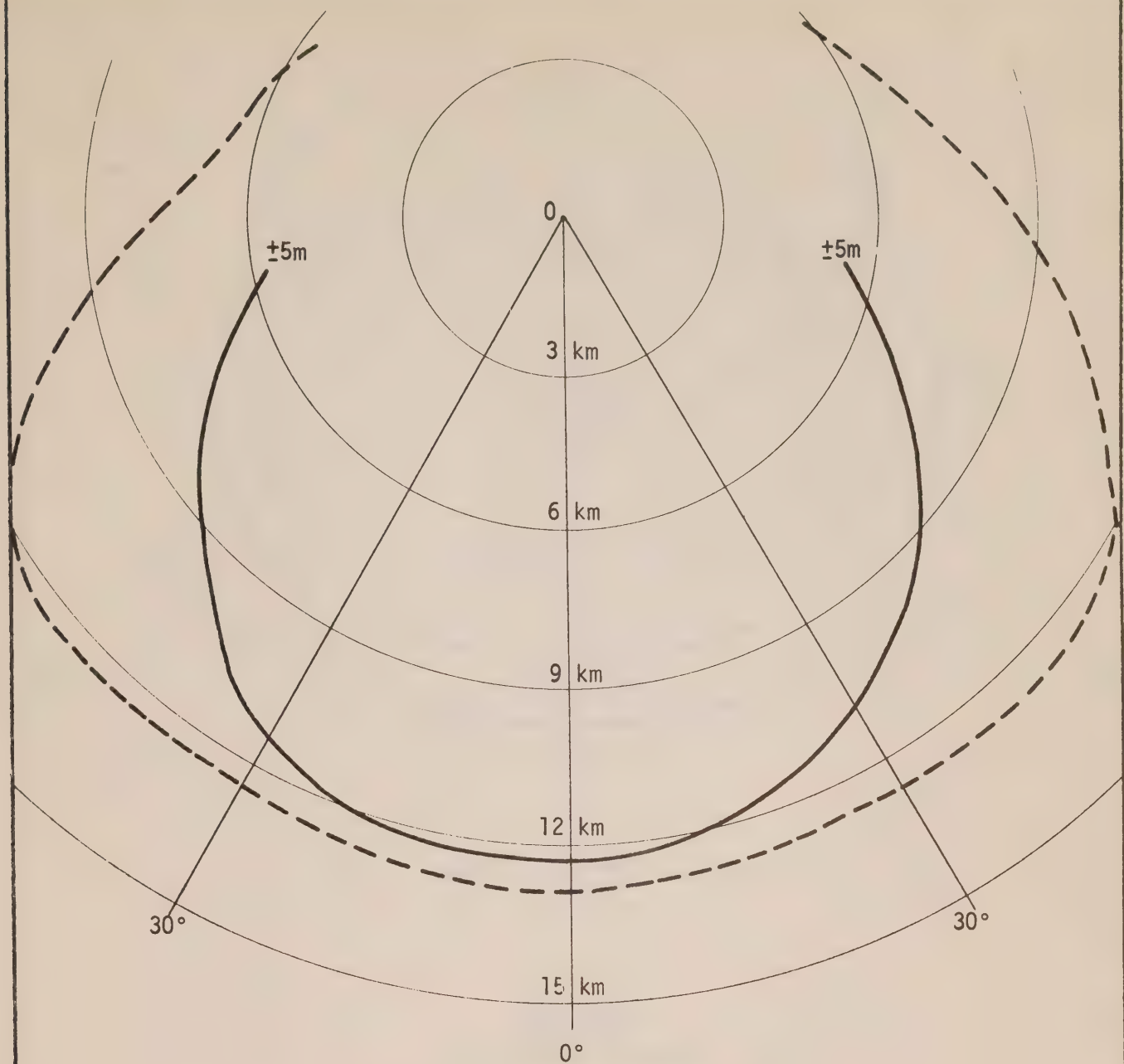
Trisponder

Beam Pattern

45° Horn Antenna

Diagram #1



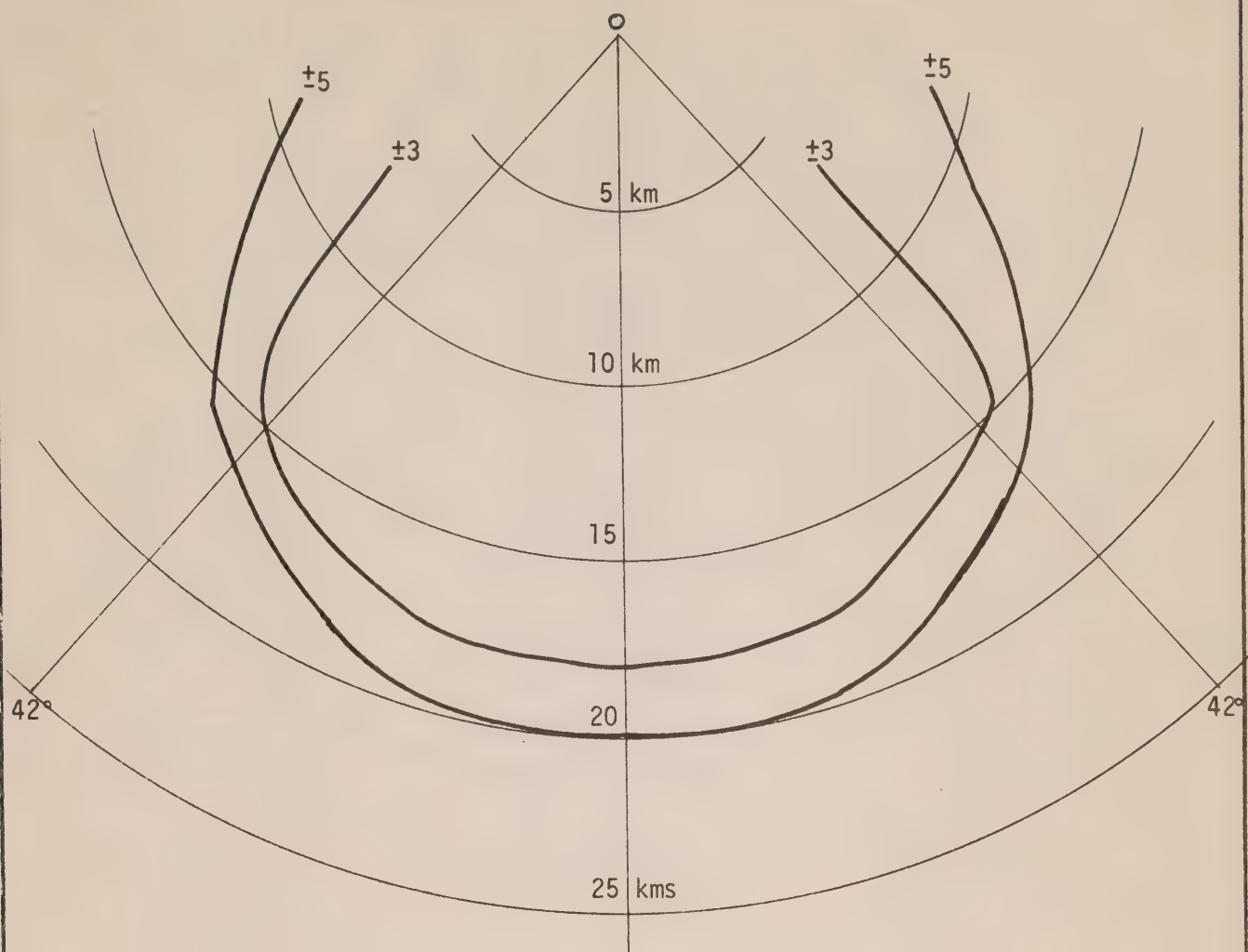


TRISPONDER  
STABILITY  
60° ANTENNA

Transponder Antenna Height < 130 ft.  
Range of Signal Loss -----  
Range of Stable Signal ————  
Transmitter Antenna Height 9 ft.  
Stability Contour in Metres  
Range in Kilometres

Diagram #2



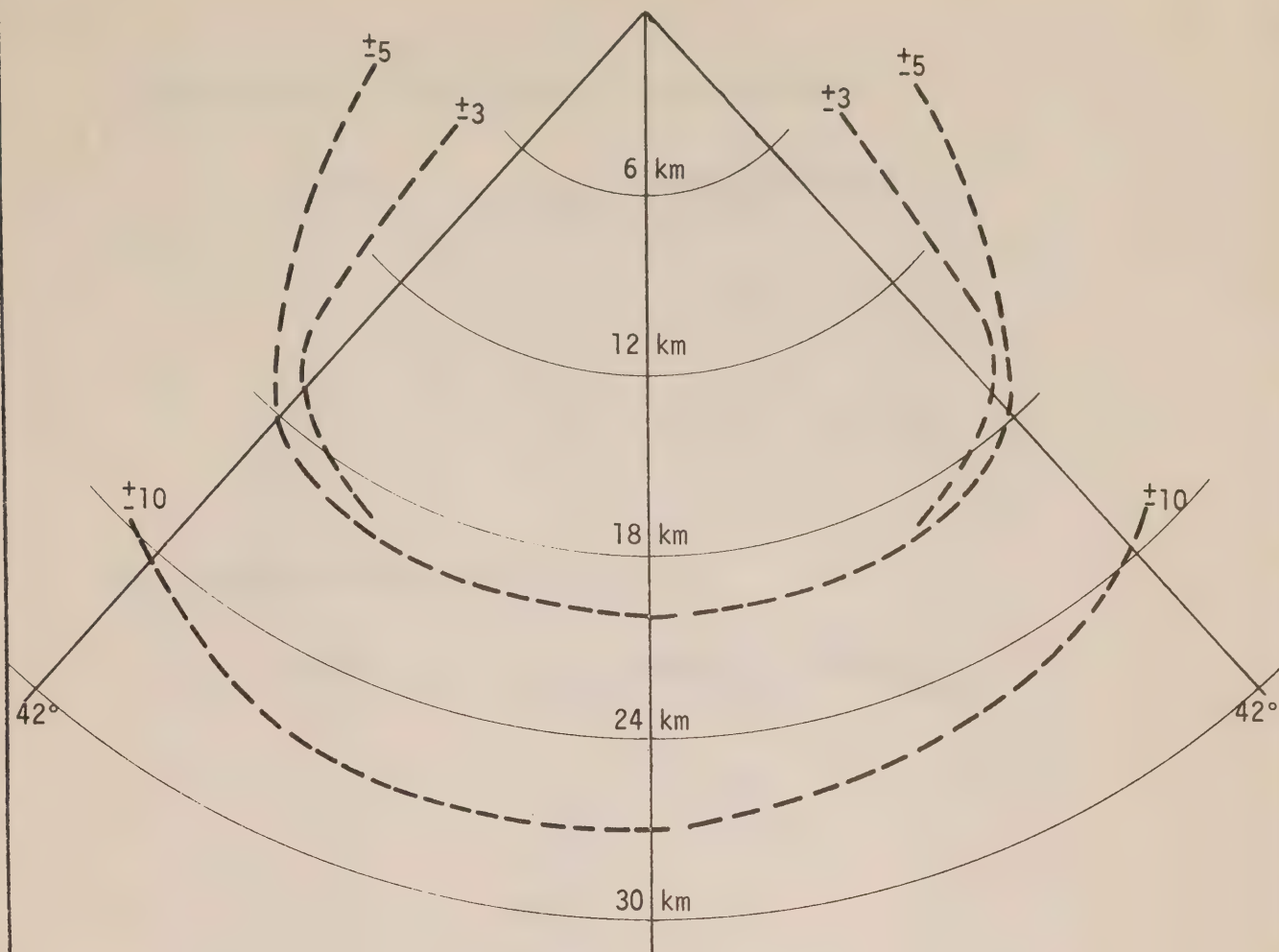


TRISPONDER  
 PRECISION  
 OF AVERAGED READINGS  
 Transponder Antenna Heights < 130 ft.  
 Contours in Metres  
 Range in Kilometres  
 Transmitter Antenna Height 9 ft.  
 84° Antenna

Diagram #3







TRISPONDER  
STABILITY  
84° ANTENNA

Transponder Antenna Heights 130 ft.  
Stability Contours in Metres  
Range in Kilometres  
Transmitter Antenna Height 15 ft.

Diagram #4



# STABILITY DATA

## 45° Horn Antenna (Transponders at low efficiency)

Range km	Transponder Heights		
	18 Ft.	50 Ft.	130 Ft.
4	±1.9	±1.2	±1.9
8	±1.4	±2.2	±1.8
9	±1.6	±1.9	±1.2
10	** ±4.1	±2.2	±1.6
11	±6.3	±4.0	±1.8
12			±4.8 **

## 84° Horizontal Beam Width Antenna

Range km	Transponder Heights		
	18 Ft.	50 Ft.	130 Ft.
6	±1.2	±0.8	-
9	-	±1.6	-
12	±10.2 #	±1.0	-
13	±1.3	-	-
14	±2.2	-	-
15	** ±3.1	±1.0	-
16	±4.1	-	-
18		±4.7	-
20		±3.0 **	-
21		±6.3	-
24			±9.4
27			±10.5

# Radar interference

\*\* Range of stability decay



# PRECISION TESTS

## Comparison of Transponder to Tellurometer Measurements.

### Transponder 'A'

<u>Range (km)</u>	<u>Median Difference (m)</u>	<u>Std. Dev. (m)</u>
0.9	+2.63	$\pm 1.65$
2.1	+4.10	$\pm 1.46$
2.9	+5.67	$\pm 2.83$ #
4.9	+2.69	$\pm 0.85$
8.9	+2.26	$\pm 1.37$
9.8	-1.22	$\pm 1.95$
12.0	-4.23	$\pm 1.03$
14.8	+1.35	$\pm 6.57$ *
17.0	-1.18	$\pm 1.41$
21.5	+21.58	$\pm 5.87$ *

### Transponder 'B'

<u>Range (km)</u>	<u>Median Difference (m)</u>	<u>Std. Dev. (m)</u>
0.9	+0.08	$\pm 1.88$
2.1	+1.62	$\pm 1.19$
2.9	+1.05	$\pm 1.41$
4.9	+0.66	$\pm 0.94$
8.9	-5.43	$\pm 1.58$
9.8	-2.98	$\pm 1.50$
12.0	+2.75	$\pm 1.26$
14.8	-3.30	$\pm 1.30$
17.0	-5.87	$\pm 2.35$
21.5	+3.40	$\pm 2.31$

# = Radar Interference

\* = Attenuation

N.B. All observations made at the centre of the beam pattern.





# BEAM PATTERN TESTS

The mean differences between sets of observations at centre beam and at various angles throughout the beam are tabulated in metres.

## 45° Horizontal Beam Width Antenna

<u>Range</u> km	<u>Angle from Centre Beam</u>	
	22°	45°
5	-	-2.1
7	-2.7	+20.2
9	-4.7	+6.7
10	-2.4	+18.2
11	+6.3	

## 84° Horizontal Beam Width Antenna

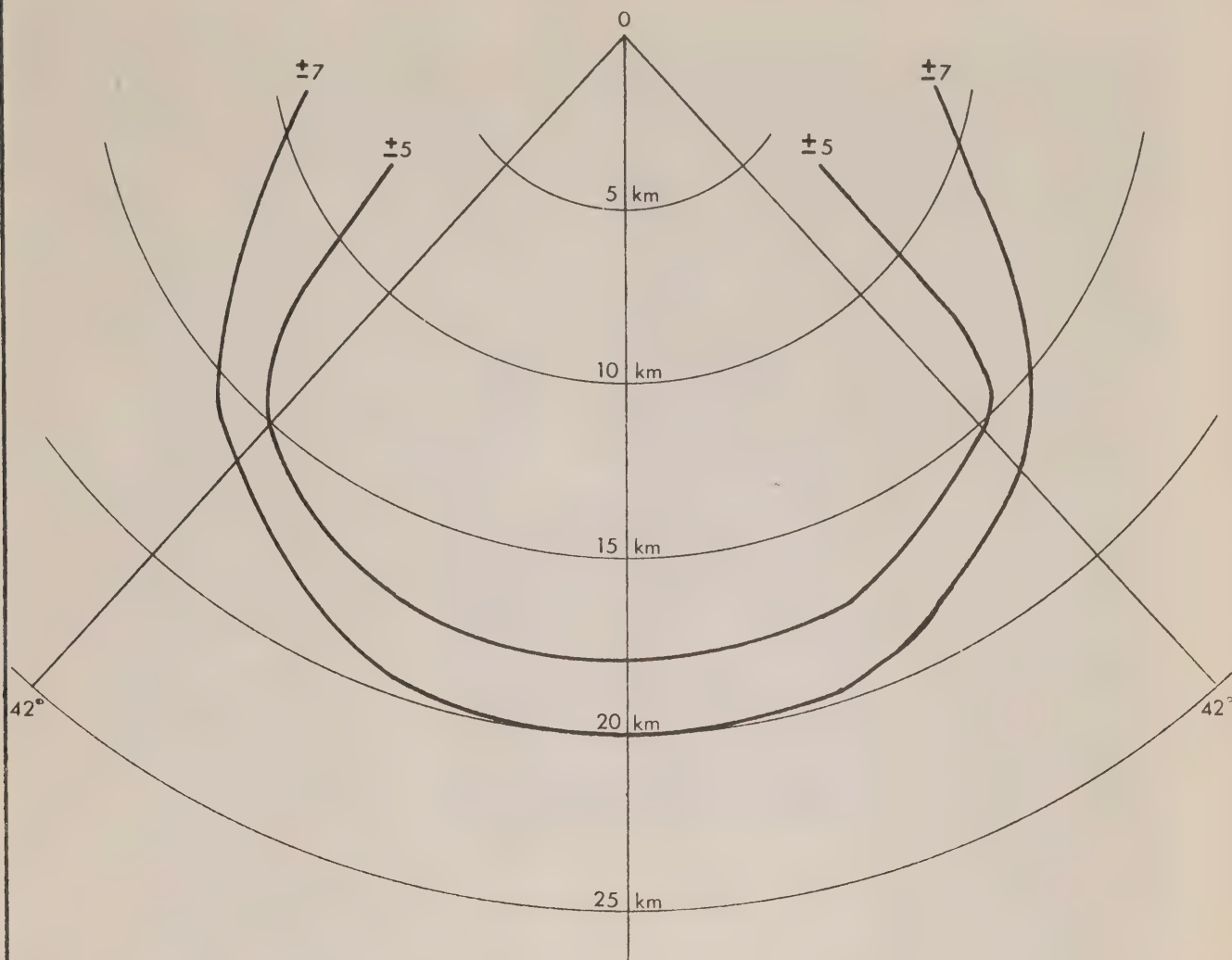
<u>Range</u> km	<u>Angle from Centre Beam</u>					
	30°	60°	90°	120°	150°	180°
5	-0.2	-0.4	-	-1.6	-2.4	-6.2
9	-2.2	-5.3	-5.1	-4.6	(+3.6 at 135°)	
12	-2.0	-5.3	-3.3	+8.8		
15	+0.6	+18.5				

## 60° Horizontal Beam Width Antenna

<u>Range</u> km	<u>Angle from Centre Beam</u>			
	30°	60°	90°	120°
5	-0.1	-2.9	-5.5	+5.6
9	-2.5	+0.6	(+17.6 at 75°)	
12	-4.3	0		

N.B. All observations were made with a transponder height of 18 ft.





TRISPONDER  
OVERALL ACCURACY

(derived from stability, precision and repeatability data)

Transponder Antenna Heights 130 ft.

Contours in Metres

Range in Kilometres

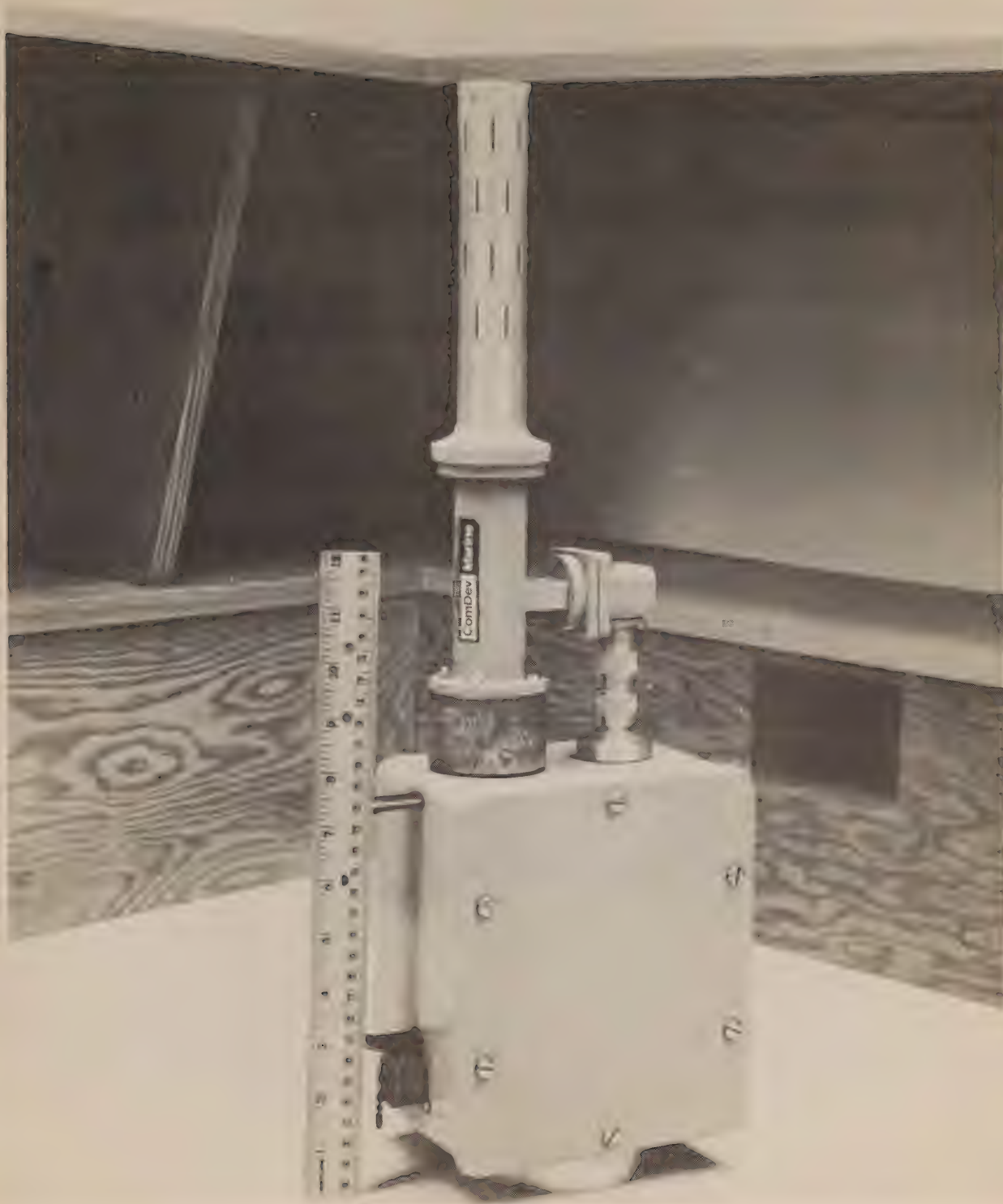
Transmitter Antenna Height 9 ft.

84° Antenna

For One Position Line Only

Diagram #8





OMNI ANTENNA  
with the base unit

Diagram #9

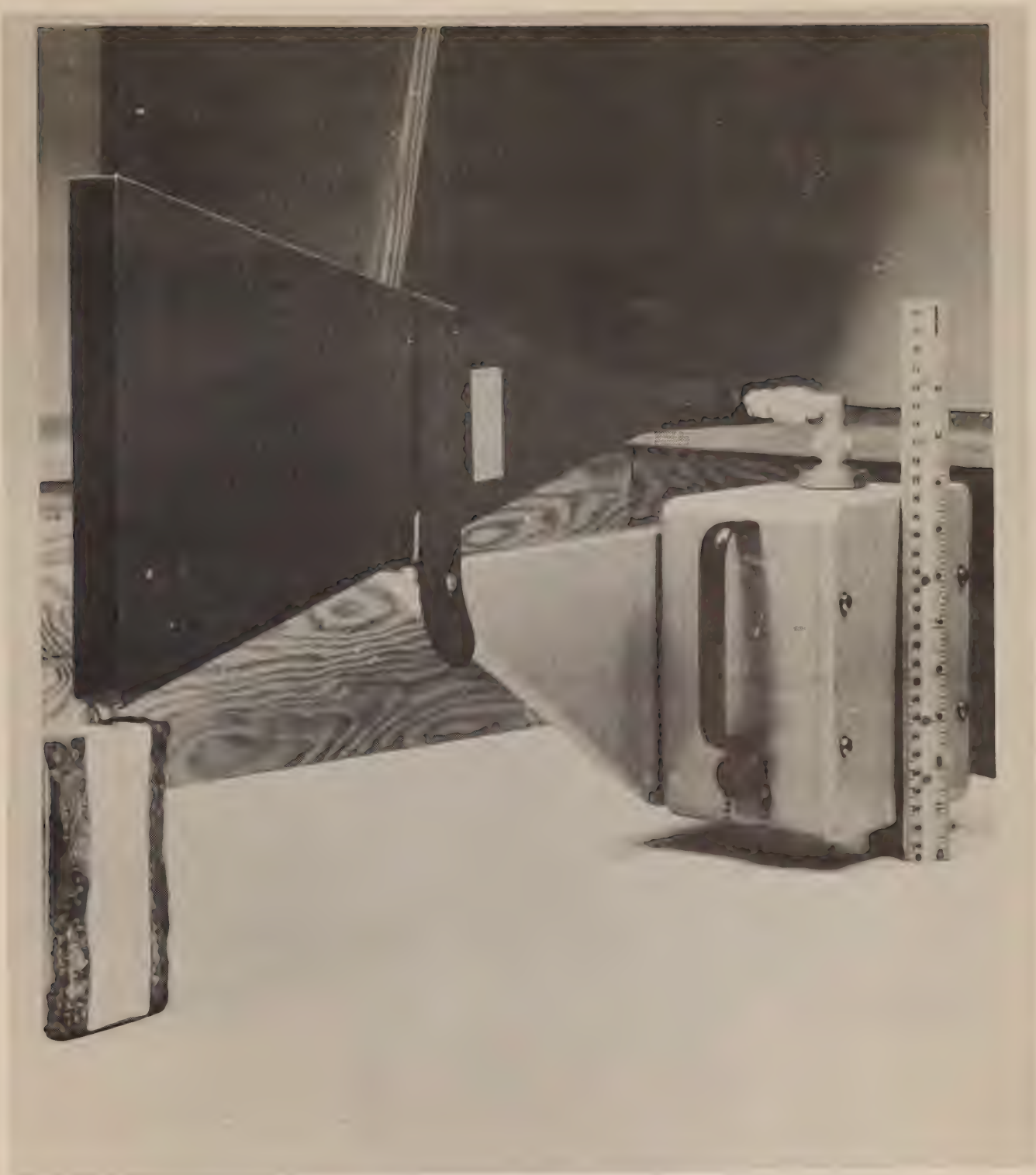






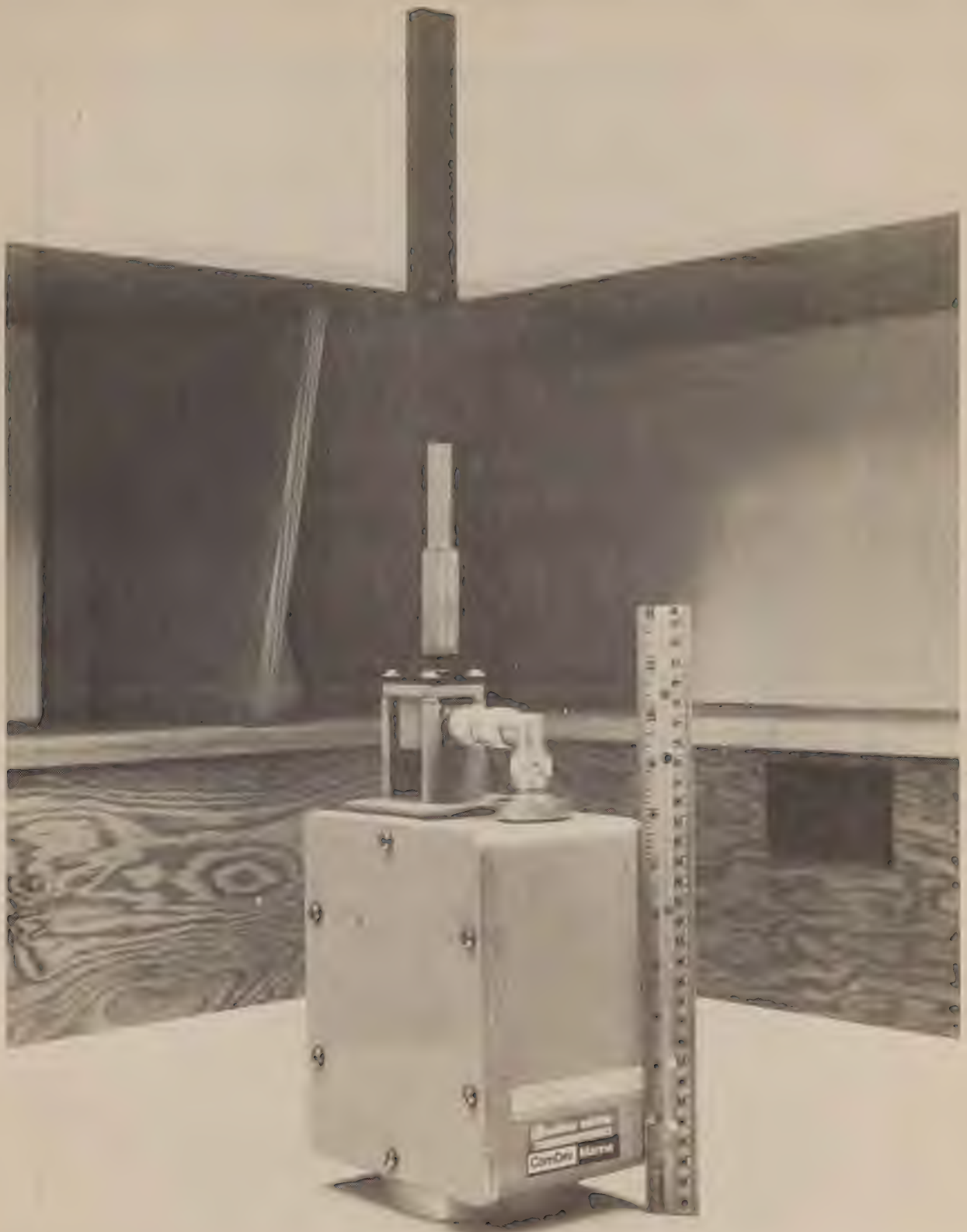
45° ANTENNA  
with a transponder





60° ANTENNA  
with a transponder





84° ANTENNA  
with a transponder





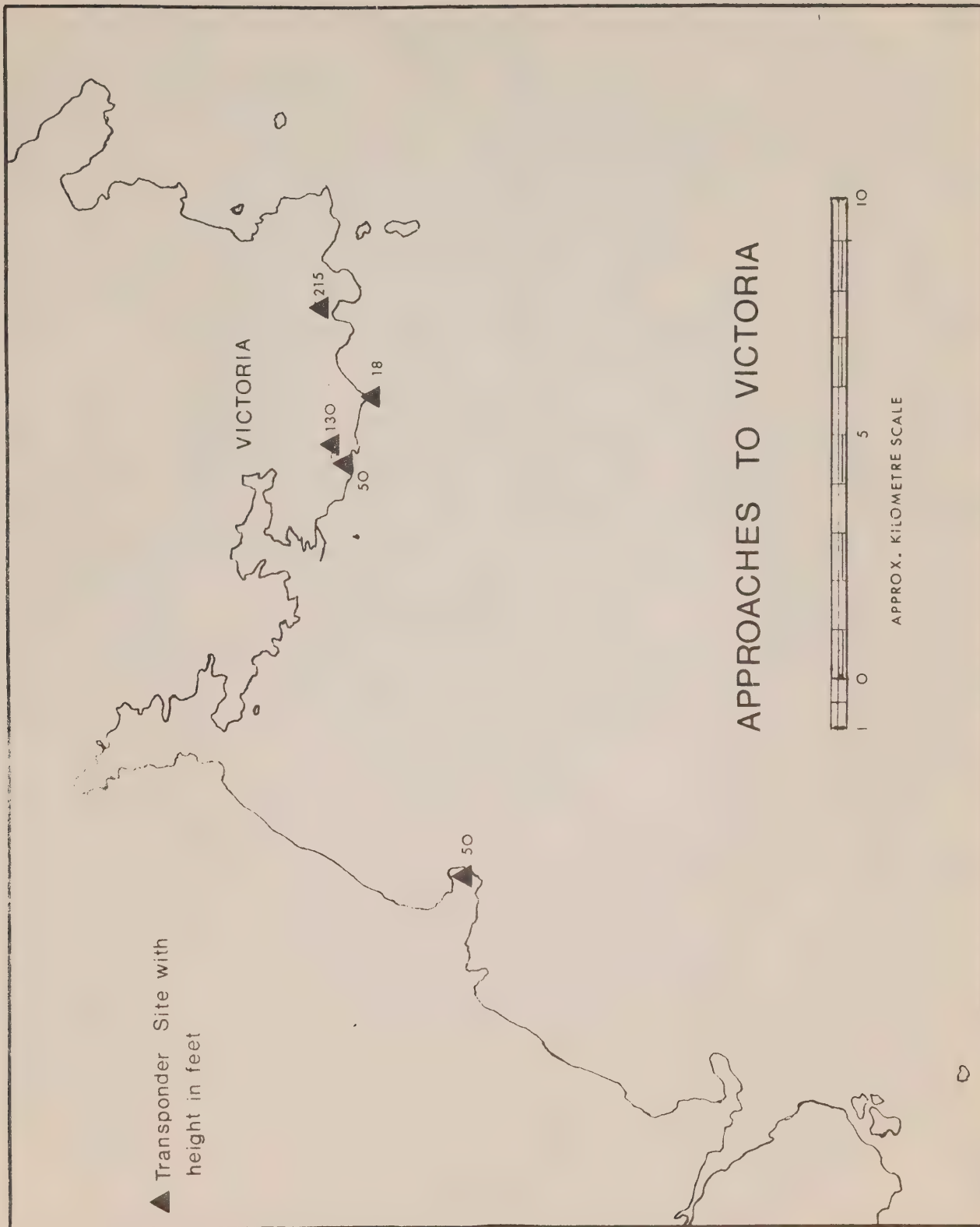


Diagram #13



210°  
150°

200°  
160°

190°  
170°

180°

170°  
190°

160°  
200°

150°  
210°

220°  
140°

140°  
220°

230°  
130°

130°  
230°

240°  
120°

120°  
240°

250°  
110°

110°  
250°

260°  
100°

100°  
260°

270°  
90°

90°  
270°

280°  
80°

80°  
280°

290°  
70°

70°  
290°

300°  
60°

60°  
300°

310°  
50°

50°  
310°

320°  
40°

40°  
320°

Radiation Pattern

OMNI ANTENNA

Vertical Plane

Radial Scale - Relative Power One Way (db)

Diagram #16

330°  
30°

340°  
20°

350°  
10°

0

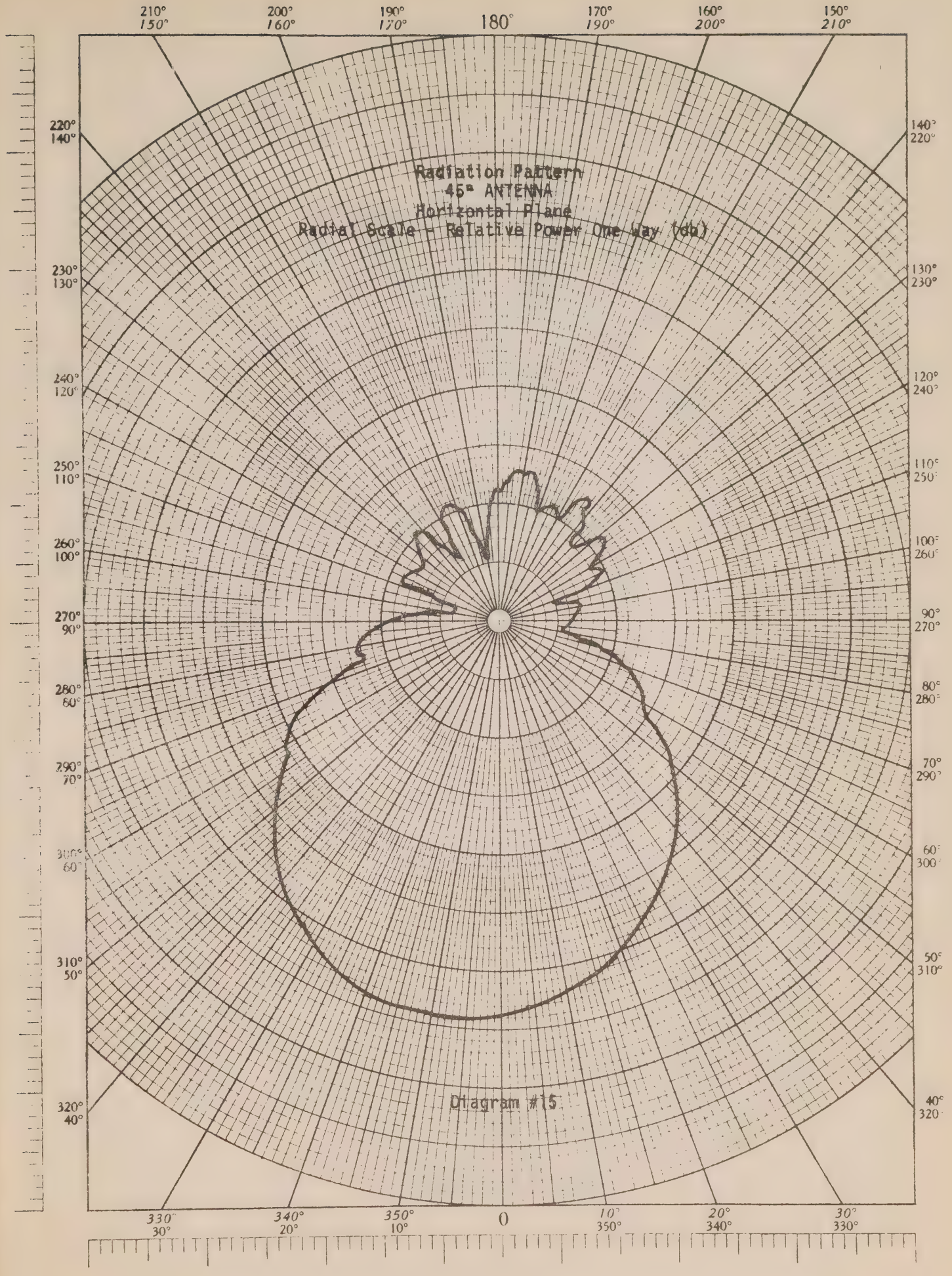
10°  
350°

20°  
340°

30°  
330°











210°  
150°200°  
160°190°  
170°

180°

170°  
190°160°  
200°150°  
210°220°  
140°230°  
130°240°  
120°250°  
110°260°  
100°270°  
90°280°  
80°290°  
70°300°  
60°310°  
50°320°  
40°140°  
220°130°  
230°120°  
240°110°  
250°100°  
260°90°  
270°80°  
280°70°  
290°60°  
300°50°  
310°40°  
320°

Radiation Pattern  
60° ANTENNA  
Horizontal Plane  
Radiat Scale - Relative Power One Way (db)

Diagram #16

330°  
30°340°  
20°350°  
10°

0

10°  
350°20°  
340°30°  
330°





210°  
150°

200°  
160°

190°  
170°

180°

170°  
190°

160°  
200°

150°  
210°

220°  
140°

230°  
130°

240°  
120°

250°  
110°

260°  
100°

270°  
90°

280°  
80°

290°  
70°

300°  
60°

310°  
50°

320°  
40°

140°  
220°

130°  
230°

120°  
240°

110°  
250°

100°  
260°

90°  
270°

80°  
280°

70°  
290°

60°  
300°

50°  
310°

40°  
320°

Radiation Pattern  
84° ANTENNA  
Horizontal Plane  
Radial Scale - Relative Power One Way (db)

Diagram #17

330°  
30°

340°  
20°

350°  
10°

0

10°  
350°

20°  
340°

30°  
330°



Algorithm for the program to process stability data

$r_i \in \{R : \text{Observed Ranges}\}$   
 $s_i \in \{S : \text{Calculated Ranges}\}$   
 $d_i \in \{D : \text{Difference of Calc. and Obs. Ranges}\}$

#A To initialize the calculation

$$s_{(1,2,3)} = \frac{1}{3} (r_1 + r_2 + r_3)$$

$$\text{and } s_{(n-2,n-1,n)} = \frac{1}{3} (r_{n-2} + r_{n-1} + r_n)$$

#B To filter interference

$$c_i = r_i$$

$$\text{If } |c_i - c_{i-1}| > 10 \text{ AND } |c_i - c_{i+1}| > 10$$

$$\text{then } c_i = \frac{1}{2} (c_{i-1} + c_{i+1})$$

$$\text{and } c_i \in \{c : \text{filtered observed ranges}\}$$

#C To calculate the linear regressions - consider the filtered observed ranges  $c_{i-2}, \dots, c_{i+2}$  where  $i$  is the index at the centre of the interval.

$$b_i = \frac{\sum_{i-2}^{i+2} c_i i - \frac{1}{5} \left( \sum_{i-2}^{i+2} i \sum_{i-2}^{i+2} c_i \right)}{\sum_{i-2}^{i+2} c_i^2 - \left( \frac{1}{5} \left( \sum_{i-2}^{i+2} c_i \right)^2 \right)}$$

$$\text{and } a_i = \frac{1}{5} \sum_{i-2}^{i+2} i - b_i \left( \frac{1}{5} \sum_{i-2}^{i+2} c_i \right)$$

$$\text{then } s_i = a_i + b_i c_i$$

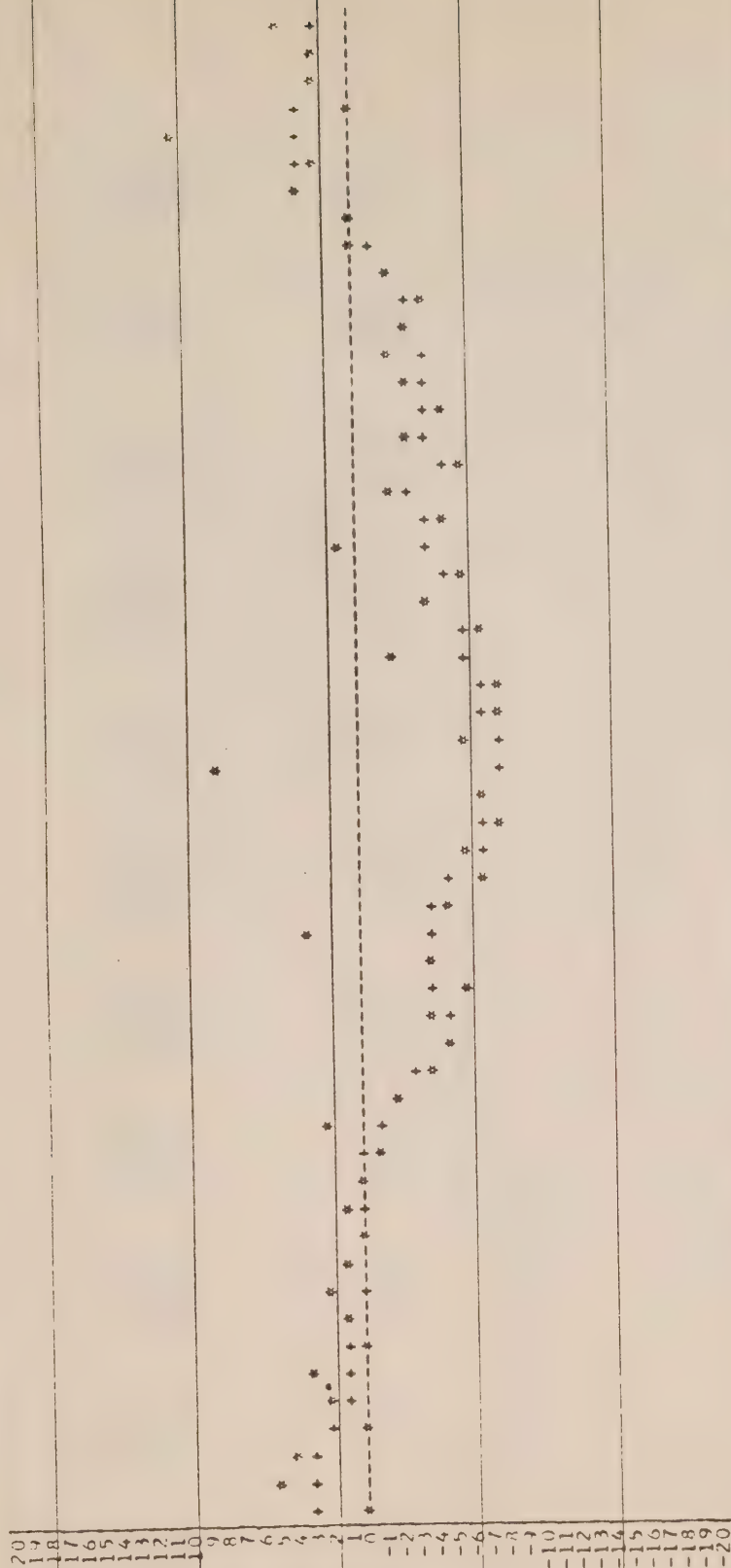
$$\text{and } d_i = r_i - s_i$$

For the next value of  $S \quad i = i + 1$





OBSERVED DATA AND ESTIMATED LAUNCH LINE  
 RANGE 20000. ANTENNA HEIGHT 50. FEET



OBSERVED DATA \* CALCULATED DATA +

An example of the computer print-out  
 from the program used to process  
 STABILITY DATA

Diagram #19







# THE EFFECT OF THE MOVEMENT OF THE OMNI ANTENNA IN THE VERTICAL PLANE

## Example 1

Tellurometer distance      14840.7 metres

Transponder 'A'

	Angle from the vertical		
	0°	4°	7°
Mean difference	-2.7	+1.3	+9.3
Std. deviation	+1.2	±3.2	±5.2

Transponder 'B'

	Angle from the vertical		
	0°	4°	7°
Mean difference	+4.3	+16.3	+39.3
Std. deviation	±3.0	±6.9	±6.7

## Example 2

Tellurometer distance      1196.6 metres

Transponder 'A'

	Angle from the vertical			
	0°	5°	8°	16°
Mean difference	-0.5	-0.8	-0.7	+2.8
Std. deviation	±1.7	±0.6	±0.7	±1.2

Note: All measurements in metres at the centre  
of the transponder antenna beam pattern.







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